Food Manufacture

The Journal of the Food Industry

Vol. VI. **September, 1931** **No. 9**

The Society of Food Industry.

ON ANOTHER page will be found a preliminary announcement of the aims and objects of this Society, now well under formation. As explained there, its inauguration is, without the least doubt, one of the most important events in the history of the Food Industry, and we recommend every reader of this journal to give it whole-hearted support, for by so doing he will be adding his weight to the big push forward which every one of us desires to see the Industry make in the next decade.

For our part, we are firmly convinced that this Society will provide just that instrument which is so essential for securing the effective co-ordination of the individualised technical work that is being carried out in the different branches of the Food Industry, minimising overlapping and duplication, facilitating an interchange of knowledge and experience, and thereby promoting the advancement of both the Industry as a whole and each of its component branches.

Then, again, every industry but the one concerned with the manufacture of foodstuffs is equipped with excellent facilities for the technical training of its young men. This also is mainly due to lack of properly organised effort; the present inadequate and haphazard state of educational facilities in the Food Industry is a disgrace and a hindrance to progress. By striving for improvement in this respect the Society would be doing work of inestimable value.

It should be understood that this Society proposes to confine itself to the purely technical side of the Industry, as does, for example, the Society of Chemical Industry. Thus it will not concern itself with industrial politics, nor will it, on the other hand, carry out research, tests, or analyses—there are admirably constituted bodies already in existence for these purposes.

Finally, it is gratifying to note that, even at this early stage, support is assured from the majority of the most prominent authorities on the manufacture of foodstuffs.

Meat Packing.

We are still inclined to associate this important branch of food manufacture with its amazing growth in the United States from 1640, when William Pynchon of Massachusetts started packing cured pork in boxes and barrels for shipment to the West Indies, to the present-day colossus, which turns out over three billion dollars' worth of products annually and employs about 150,000 individuals. In comparison the British packing industry seems insignificant—in 1924 about 14,000 persons were employed in bacon and ham curing and in the manufacture of lard, sausages, etc., and these products are valued at about £25,000,000; but there is, as a matter of fact, a cheerful aspect of the situation in that both these figures have been doubled since 1907.

Home Production.

That there is, however, much scope for expansion of the home industry is shown by the fact that of the huge exports from U.S.A. we took, in 1927, 84 per cent. of the cured hams and shoulders, 40 per cent. of the bacon, and 32 per cent. of the lard. Then again, according to the 1924 census, the home consumption of lard is about three million cwts., but only about one-fifth of this is of home origin; the consumption of bacon and hams is about eleven million cwts., but only about one-seventh of this is of home origin. In this trade the chief feature has been the rise in imports of bacon from Denmark, which averaged (into the U.K.) 86,000 tons in 1905 to 1909, but as much as 206,000 tons in 1924 to 1927. This increase in Danish bacon has been accompanied by smaller rises in receipts from other Continental countries—*e.g.*, Sweden and the Netherlands—but by a reduced importation from U.S.A.

By-Products.

There are several causes contributing to this state of affairs. One is lack of organisation, especially on the by-products side; another is lack of properly

organised co-operation between the packer and the farmer—including defective supplies of a standard commercial pig; a third is the neglect of technical research. There are others, of course, but it will be sufficient to comment on the ones named.

In tracing the development of the American packing industry, one recognises an initial stage—often referred to as "the local butcher and slaughter-house period"—when it was obviously impossible to make effective use of the numerous, small, and widely scattered accumulations of offal. It is, in fact, these conditions which still prevail in this country, and, as American history has shown, it was only when these wastes became accumulated in large quantity, due to the growth of large-scale packing plants, that they could be used as raw materials for by-product manufacture. With the rapid growth of the American industry, increasing attention was given to the question of profitably utilising the waste, and there grew up around the larger packing plants a group of satellites which bought this waste. Later, however, the production of by-products was taken over by the packer himself. At the present time the expansion of the packing industry depends, as the Americans themselves admit, to a large extent upon scientific research, and the by-products of a modern packing plant are continually being developed into others of greater value. The chemist, starting with the fundamental problem of preventing deterioration in perishable meat products—a matter involving an understanding of the principles of bacteriology and biochemistry—and applying this knowledge to the control of refrigeration, curing, and canning, has extended his field of activity enormously, and now juggles with hides, skins, wool, hair, fats, oils, greases, soap, pharmaceuticals, casings, glue, gelatine, fertilisers, animal and poultry feeds, bone and blood meals, albumen, and a host of other interesting, though somewhat unsavoury, materials.

Home Conditions.

English conditions are, however, not American conditions—very far from it. Yet we have to thank that country for much that has been incorporated in the lay-out of such up-to-date factories as we have over here. We well remember the most progressive of British packers—a man truly remarkable for his drive and enthusiasm—declaring that those Americans who had been round his Midland factory were amazed to find an organisation which, for efficiency and equipment, was in advance of anything in U.S.A. It shows what can be done; but even in the case of this shining example the by-products end of the business is, relatively speaking, very small beer. The output is not big enough to justify an attempt at anything so elaborate as we have mentioned in connection with present-day developments in Chicago.

Difficulties.

Another difficulty we are up against in this question of "getting the most out of animal offal" is the multiplicity of abbatoirs, most of which are quite small affairs, and coupled with this is the apparently immutable practice of selling the offal to more or less itinerant collectors, who are not, generally speaking, particularly well disposed towards scientific methods.

It is quite evident, then, that so long as meat factories and slaughter-houses are small, numerous, and scattered, there is little hope of taking the by-product business much beyond the fat and meal stage. In common with Mr. McLachlan we would like to see British glands being used for medicinal preparations, but until the present structure of things is radically altered we are not particularly optimistic.

Fat and Meal Production.

There is, however, no excuse whatever for the offal collector, the packer, or the abbatoir neglecting to make use of the fat extraction and meal production plant, which has been developed to a high state of efficiency by several engineering firms in this country. Plant of this character has for a number of years been the subject of an astonishing amount of quiet investigation and experiment, with the result—and we have no hesitation in stating it—that British plant for the production of fat and feeding meal from animal (or fish) offal is definitely in advance of both German and American.

Choice of Plant.

As most people know, there is a fairly wide choice of plant and processes available for offal treatment; the main grouping is into digester, dry-rendering, and solvent extraction systems, and there are many modifications possible in each of these systems. It is impossible to arrange them in order of merit; each is best adapted to a special type of offal and a particular combination of circumstances. This was brought home to us more especially in the course of a lengthy discussion with probably the foremost authority on the subject, Mr. James MacGregor of Silvertown. This engineer has devoted the greater part of his life to problems of offal treatment and has carried out a very large number of investigations and experiments. It is clear that the choice of plant and process for offal treatment requires very careful consideration. There are so many factors that have to be taken into account—the amount, character, and grade of offal, the nature and grade of the products aimed at, and so on. In one case dry-rendering would be advisable, and it might be either a vacuum or an ordinary pressure process; in another case some form of solvent extraction process might be called for; in yet another it might be best to use a combination of

the two processes, and even the digester process may to-day find a place in special instances. Finally, the best advice we can give to those who are interested in this offal treatment business is to make sure of getting sound guidance in the matter of selecting a process.

The Glut of Wheat.

The present world wheat situation is the most astonishing in the history of the grain trade. For the first time in living memory a surplus of grain equal to almost two years' consumption has been built up, and prices have fallen to an unprecedentedly low level. According to authoritative statistics, there are some 700 million quarters of wheat unsold, and this year's crop is estimated at something like 440 million quarters. Some accounts have made much of the partial crop failure in Canada, but it is doubtful if this will make much difference. It must be realised that the requirements of the European markets are now substantially the same as before the war (about 70 million quarters per annum). In the producing countries a very different state of affairs prevails. Canada, in spite of the drought, has produced about 2 million quarters more than the 29 millions of 1913. The United States of America have produced 14 million, the Argentine 20 million, and Australia 13 million quarters more than in 1913. The Russian re-entry into the market is furnishing some 25 million quarters which have not been available since pre-war days. On the Continent of Europe production of home-grown wheat has been developed by maintaining the price of bread at a fictitiously high, and uneconomic, level, and also by the fixing by law of the proportion of foreign wheat to be allowed in a grist at round about 5 to 10 per cent. The single big individual importer of wheat is the United Kingdom, and she will be faced with a colossal supply far in advance of her most extravagant demands. Recently Liverpool wheat for October delivery touched the low level of 3s. 8½d. per 100 lbs., and Russia lowered her offers by 1s. 6d. per quarter and was looking for markets at almost any price. If Russia has as much wheat to dispose of as some authorities state, the market position is likely to be queer and future buying bearish.

Undoubtedly consumption has not kept pace with production, and modern methods, with the mechanisation of agriculture, have resulted in a considerable over-production. One solution of the difficulty would be an adjustment of acreage devoted to wheat, but several years must elapse before production can be reduced to an economic level. Relief to the situation might result from an increased consumption of wheat amongst the rice-eating people of the East, and the price of wheat is now low enough to warrant this consumption. It might also be possible to convert the gluten of wheat flour into glutamic acid, which commands a fair price, particularly in Japan, where it is eaten in considerable quantities. All these possibilities will, however, take time, and for the next year or so the position will be very delicate, and even lower prices may yet be reached.

Barley Bread.

In view of the enormous surplus of cheap wheat, it is nothing short of astounding that attempts should continue to be made to popularise the consumption of barley bread, and that in an industrial area like Swansea of all places! There can be no outstanding superiority about barley bread compared with the wheaten variety, which is generally conceded to be the most nutritious, wholesome, and easily digestible of all cereal foods. "Observer," in the *N.A. Review*, states that barley bread was once very popular in Wales, and in many agricultural districts was the food of the labourer. His view is that barley bread is not likely to become popular when wheaten bread is available. It can only be in times when wheat is very scarce and expensive that barley would be seriously considered. In the hungry forties, we agree, it was consumed, and in some quantity, but it was hungry stomachs that caused its consumption, and many ruined digestions resulted from it. Barley has very little fattening power, and its protein has very different properties from those of wheat gluten, which render it far inferior to wheat from the bread-making point of view. As "Observer" points out, however, it might be used for making "the slendering stuff imported from abroad." While barley is less easily digested than wheat flour and its flavour is grosser, it does seem a suitable cereal for what has been called "filling up" purposes—that is, a food that will fill without fattening. Made into thin aerated cakes, there seems no reason why barley meal should not be used, and certainly it has not the peculiar flavour of rye, that must be acquired before it can be enjoyed. As for bread-making, however, it is unsuitable and its use uncalled for, and it is hardly likely that the efforts in Swansea will meet with any pronounced success.

Low Temperature Research.

The interesting and important researches on food preservation by low temperature methods, which have previously been referred to in these notes, are being continued actively at Cambridge and East Malling. Research on the preservation and transport of fish is being carried out at Aberdeen.

One of the most important problems to be faced in meat or meat by-products storage is that of the changes which occur in some of the more common fats during storage, which may bring about a very unpleasant flavour. These changes are now being investigated, and an attempt is being made to link

them up with the composition and the alteration in flavour of each fat. In this connection the investigations on the storage of chilled beef and frozen mild cured bacon are of great economic importance.

In the canning section, work has been carried out on the influence of hydrogen ion concentration on the corrosion of tinplate containers by various fruits. Such fruits as cherries, prunes, and bilberries, which are of low acidity, cause more losses from hydrogen bulges and bursts than fruits which are more acid. Practical experiments with cherries and prunes, which normally give trouble, have proved that the addition of a little citric acid checks the losses to a remarkable degree.

The part which a cold store could play in the canning industry has also received consideration, more particularly with a view to prolonging the canning season, and already a method for storing peas indefinitely in the frozen state in a condition suitable either for ordinary cooking or canning has been devised.

Further tests on the gas storage of English apples by regulated ventilation have been carried out. The losses during storage for five months were less than ½ per cent. It seems established that the vitamin content is not affected by the cold storage.

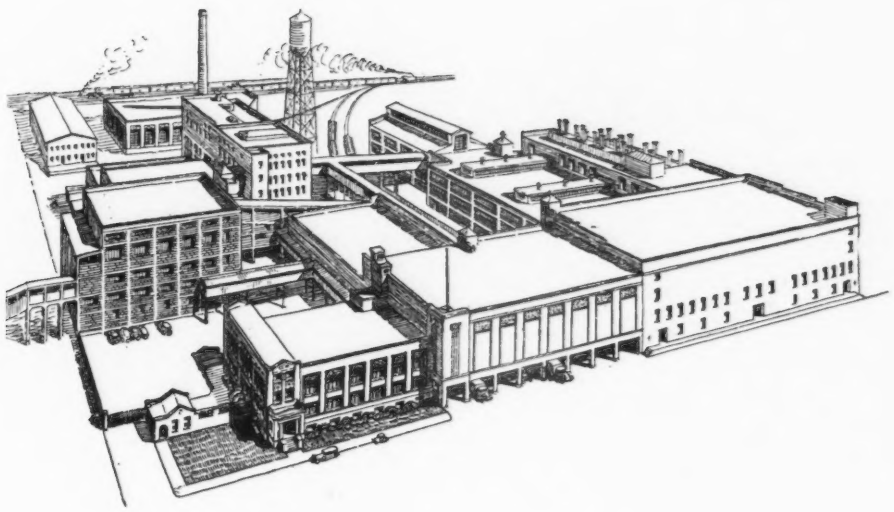
Such researches as these are bound to have an important influence on many food industries. The hectic rush in the canning season, when it is a question of canning the fruit or allowing it to go bad, often led to slipshod and rushed methods. If the fruit or vegetables can be preserved for some time without deterioration, the benefit to the canning industry will be enormous. Less plant will be required, and work can proceed at a regular and even pace under proper and adequate supervision, and the possibility of mistakes will be reduced to a minimum.

Bleaching by Enzymes.

According to a recent issue of *Milling*, the bleaching of flour with enzymes obtained from the soya bean or other legumes is now a commercial process in America. We have not come across its use in this country on a large scale, though we understand that a certain amount of experimental work has been done, and recently several patents on the subject have been taken out. In certain cases the beans are soaked in water and allowed to germinate somewhat, after which they are ground and mixed with gelatinised wheat starch. The mixture is dried *in vacuo* at a low temperature and reground. This is added to the extent of 1 to 2 per cent. It is claimed that enzymes present in the soya bean act on the carotin of the flour in moist and warm conditions—*i.e.*, during the fermentation of the dough—to such an extent that almost complete decolorisation results. Other legumes than the soya are specified as suitable for bleaching flour. Sometimes a green malt infusion is mixed with the legume, and sometimes ammonium or calcium phosphate is added, in which case the improving action of the mineral salts is brought into play, in addition to providing a yeast food. The Departmental Committee which sat on the bleaching and improving of flour with chemical substances were unable to find sufficient evidence to condemn the use of the chemical bleachers and improvers, but they deprecated the use of some of them, such as chlorine, nitrogen trichloride, and benzoyl peroxide. They also stated that they preferred the physical methods of improving by heat treatment to the chemical processes. If a really satisfactory bleach can be obtained by the addition of a vegetable substance, the objections of the anti-chemical treatment people will be met; but, as we have pointed out before in these notes, the question of to bleach or not to bleach is a very vexed one, and whether the oxidation of the carotin is advisable or not is not settled. One point to be considered about the new method is that of flavour. Peas, in very small amounts, impart a curious and objectionable odour and flavour to flour, and it may be that the soya or other legumes might also influence the flavour.

Standards for Jams.

The Society of Public Analysts makes a very important statement in the *Analyst* (July, 1931) relative to the standards for jam. The Council of the Society has had under consideration the action to be taken by public analysts with regard to jams which bear the name of a fruit or fruits, but do not bear the descriptive labels agreed upon with the Food Manufacturers' Federation—*i.e.*, jams which bear neither the "full fruit" nor the "lower fruit" standard. The fruit content of "full fruit" jam has been accepted by the Council as the minimum amount of fruit which should be present in an article sold, without qualification, as jam; the word "jam" being used in conjunction with any named fruit. It follows that any named fruit jam containing a lower proportion of fruit than this should, for the information of the purchaser, be suitably labelled. The "lower fruit standard" declaration provides for such a jam and also gives the requisite information to the purchaser. The Council of the Society of Public Analysts is of the opinion that any jam which (1) contains less of the named fruit or fruits than the proportions specified for that jam in the full fruit standard specification, and (2) is sold without a declaration disclosing its lower fruit content, should, for the purposes of the Food and Drugs (Adulteration) Act, 1928, be deemed deficient in fruit. This is a most important decision, and anyone concerned with the jam trade, particularly the retail side of it, should examine all stocks and see that they are labelled in accordance with the agreed definitions.



Meat Packing Meets New Problems

By C. ROBERT MOULTON, PH.D., A.C.S., F.A.A.A.S., F.A.P.H.A.

In the following article Dr. Moulton, well known as Director of the Department of Nutrition of the Institute of American Meat Packers and author of books and papers relating to science and research in the meat industry, discusses, at our special request, the progress made in attempting to solve the various problems now confronting the meat packing industry.

THE CONSERVING of meat foods for greater lengths of time than are possible under ordinary conditions has been practised for many years by man, at least by those races or tribes that found it convenient or necessary to use any quantity of meat in the diet. Natural refrigeration, drying, curing, and cooking have been employed for many years to make meat keep from times of plenty to times of relative scarcity. When the conserving of meats became an industry these methods were also used in that industry, and were modified or adapted so as to serve better for the purpose. Artificial refrigeration served to complete the industrialisation of meat conserving. The necessity of handling large quantities of meat and of furnishing a rather constant supply of finished products from a rather irregular seasonal source made it necessary for the meat-packing industry to study its methods of conservation with a view to increasing the quality and decreasing losses. A discussion of some of the problems that have arisen and of attempts at their solution follows.

Refrigeration Problems.

The keeping of meats by means of low temperatures may be subdivided into chilling, used for fresh meats, and freezing, whereby the product is actually frozen and the possible time of storage is increased. The greater part of the carcass of the meat-producing animal finds, excepting the hog, its market as fresh meat. After the dispatching of the animal and the preparation of the carcass the meat must be chilled in order that it may keep. In the early days of the industry, and even in recent times in some quarters, much attention was given to the alleged necessity of allowing the "animal heat" to leave the carcass before it was chilled to a low temperature. Consequently coolers were constructed with a fore-cooler held at a moderate temperature, where the "animal heat" was allowed to dissipate. When this was accomplished the carcass was transferred to a much cooler room and the chilling was completed. Even when the fore-cooler was abandoned in the packing industry the idea of "animal heat" persisted, and one was warned against the too rapid chilling of the meat when first put into the chill room. A rapid chilling of the surface was supposed to retard the heat loss from the inner portions of the meat, and thus "animal heat" was sealed within the carcass, with the resulting "souring" or spoilage of the meat.

This superstition with regard to "animal heat" was overcome by science and practice working together. The cause of meat spoilage was shown to be bacterial and enzymatic in nature, and the cure, or rather prevention, lay in reducing contamination and then lowering the temperature of the meat as rapidly as possible to a point near freezing, at which

temperature the growth of bacteria and enzymatic changes are both greatly retarded. This was found to work out well in practice. Consequently meats formerly chilled in forty-eight hours are now chilled in twenty-four or even eighteen hours with the most satisfactory results. Spoilage and loss of quality is reduced and better meats are produced. Rapid chilling of meats in low temperature chill rooms did not always meet with perfect success. If a low temperature in one or two parts of the chill room is alone relied on there may be some spoilage. Of as great or even greater importance is uniform chilling throughout the room. This is accomplished by good air circulation, the avoiding of air pockets, the proper spacing of the carcasses, and the proper relation of load to refrigeration capacity. A system much used to accomplish these purposes is that employing spray lofts and brine sprays to chill and circulate the air.

Fresh chilled meats usually go into consumption within a few days. If the temperature within the meat has been reduced promptly to 34° to 36° F. (or even nearer the freezing point), the meat may be kept for some length of time in a cooler of about the same temperature. Certain fancy trades require the hanging of the fresh meat for two or three weeks in order to ripen and tender it. Moulds or "whiskers" may grow on the surface of such meat and exposed muscle surfaces may darken. The removal of the mould and dried and darkened surface leaves a tender and delicious meat in great demand by epicures. The changes that occur in such meats during storage have been studied by several investigators. Under the usual commercial conditions of high humidity (92 to 95 per cent. in the study on which this is based, but nearer 90 per cent. for typical conditions) in the storage coolers meats may not be kept for more than seven or eight weeks, while two to four weeks represents average practice for ripened meats. When the humidity is reduced to 70 to 80 per cent. saturation chilled meats may be stored for as long as six months, and still be wholesome. Under such conditions, however, the meats lose much weight, due to the evaporation of moisture from the carcass. There is also a further loss entailed when the dried and darkened surface is removed before use. For these reasons long periods of storage are impractical.

Freezing Meats.

Freezing meats to make them keep has always been rather successful. But, unfortunately, after being defrosted such meats do not keep well, and are frequently subject to drip and loss of meat serum. This applies especially to beef, in lesser degree to pork, while lamb and mutton can be frozen with the greatest success. A microscopical study of frozen meats showed that freezing caused the formation of large ice crystals largely outside of each muscle fibre with some rupture of the cell wall by pressure. On defrosting this liquid was only partly reabsorbed, and so frozen beef was prone to drip.

The freezing of pork shoulders, hams, and bellies for later cure when the trade required it has been practised for many years. Such frozen meats behave somewhat differently during curing, and thus require special handling.

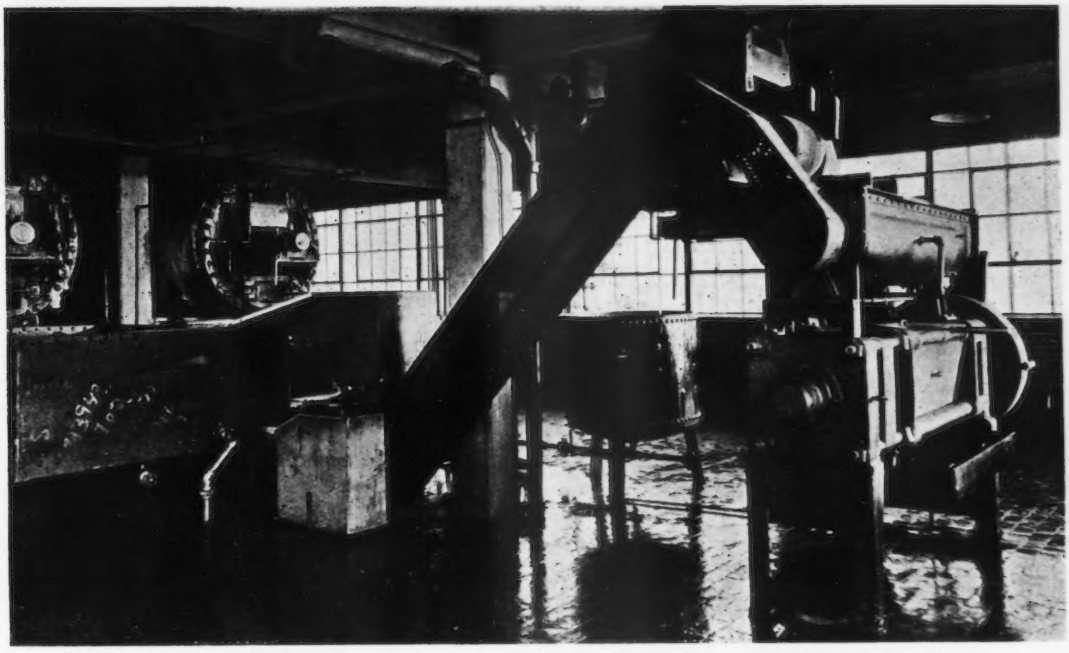
In quite recent years rapid methods of freezing meats have been developed. Many of these are quite successful. Success in all cases depends wholly or largely on very rapid freezing. This is brought about first by reducing the thickness of the meat to be frozen to about two and a half inches, and, second, by securing a very rapid heat transfer between the meat and the cooling medium. In one process the meat, wrapped in cellophane and pressed into a thin carton, is kept in contact above and below with metal belts chilled to a very low temperature with calcium chloride brine. In another case atomised brine sprays or fogs are used to give rapid freezing. In all cases freezing is so rapid that small ice crystals are formed within the muscle fibre and no rupture results. If thick pieces of meat are frozen by this method quick freezing occurs only to a depth of an inch or two. From there on slow freezing occurs, due to the naturally slow transfer of heat through meat tissue. The centre of the piece is slowly frozen, and has the characteristics of slowly frozen meat. One method of quick freezing relies upon treatment of the tissue (fish fillets) with alkaline salts (hydroxides, carbonates, or phosphates of sodium, potassium, or ammonium) so to affect the colloid nature of the tissue that freezing will not cause a drip after such meat is thawed. This process also employs a very low temperature.

Quick frozen foods are being merchandised in the United States and elsewhere. Frozen fish fillets are rather widely distributed, and experiments are being carried on with the merchandising of quick frozen retail cuts of meat. Such cuts as chops, steaks, small roasts, stews, and edible glands are quickly frozen in the packing plant, marked with the packer's trade mark and the net weight when packed, wrapped in cellophane, and displayed in specially refrigerated show cases. The merchandising of such product is still in the experimental stage. Drying and darkening of the surface of such meats may occur, and it is claimed by some that gradually the small ice crystals grow and cause damage to the cell structure.

Other meat distributors claim that the good results of the above method of merchandising can be secured without its disadvantages by selling fresh chilled meats merchandised in a similar manner but not frozen. By proper co-ordination of distribution with demand, by the use of containers refrigerated with "dry ice" or solid carbon dioxide, and by the centralisation of the functions of cutting and packaging, much success is now being enjoyed by certain agencies operating in one or more Eastern cities.

Curing Problems.

Time-honoured methods of curing meat have involved one or more of the following curing agents: salt, saltpetre or sodium nitrate, sugar, spices, and vinegar. Most of the better grades of cured meats have been cured with salt, saltpetre, and sugar. The length of time required to cure a ham depended upon



Lay-Out of Machinery Used in the Dry Rendering of Fatty Tissues.
Left to Right: Fat melter, Sieve box, Elevator, and Expeller.

View of a Pork Cutting Floor in a Modern Packing Plant where Hams, Shoulders, Bellies, and Loins are Trimmed and Prepared for the Market or for Curing.

(Courtesy of the National Provisioner, Chicago.)

the strength of the curing pickle used, the practice with regard to pumping, the size and fatness of the ham, the temperature of the curing cellar, and other factors. One could not change the size or fatness of a given ham excepting by skinning and partly defatting the very fat hams. The proper temperature for curing was found to be limited, and there were not many practical variations as far as cover and pump pickle strength or manner of pumping was concerned. So in practice it turned out that aside from the size and fatness of the ham no other factor could be so altered as to affect the time of cure to any extent. In curing a 12 to 14 lb. ham sixty days was standard practice, and seventy-five days were required for large hams.

Saltpetre was used in meat curing in order to fix the characteristic colour of cured meats. It also had some effect in conserving the product. The process of colour fixation was slow and really governed the length of cure. The problem was to use such a concentration of salt so that when coloured it would not be too salty. Soaking the cured ham was one way to accomplish this. The chemist studied the curing process, and found that saltpetre itself did not fix the colour of the meat. It first was reduced to nitrite by bacteria present in the meat and pickle. A logical suggestion was to replace the saltpetre or Chili saltpetre with nitrite in order to avoid the necessity of awaiting this reduction. Experiment showed that nitrite could successfully replace nitrate in the sweet pickle curing of meat, and that the time of colour fixation and thus of cure was greatly reduced. In fact, colour fixation no longer was the criterion of when to stop the curing process. Colour fixation occurred early during cure, and so proper salt penetration became the criterion. Consequently milder cured meats could be produced, and the length of time of cure could be materially reduced. Hams are now cured in a length of time amounting to three to three and a half days per pound. Thus a 12 to 14 lb. ham may be cured in forty to forty-five days, or even less time.

In using nitrite in place of nitrate it was found that one-tenth as much nitrite as of the nitrate which had been used in the nitrate formula was usually entirely satisfactory. However, much depended upon the strength of the old nitrate formula. A change from one cure to the other had to be made slowly, since it took some time for the bacterial flora to accustom themselves to the changed environment. Some producers had trouble with the nitrite cure and changed back to nitrate. Others were entirely successful, and produced all or most of their cured meats by the use of sodium nitrite. Some found that they could secure the advantages of nitrite and still retain the advantages inherent in nitrate by means of what are known as mixed cures. The advantages of mixed cures lie in the early colouring and curing properties of nitrite and in the greater stability of nitrate.

In the sweet pickle curing of meats with nitrite only it was found that frequently towards the end of cure the nitrite had largely disappeared from the pickle. In some cases none remained. This reduced the protection against undesired bacterial change, and so such meats at times spoiled more readily than they should. Sodium nitrite is a rather labile substance. Bacteria readily reduce it; acids decompose it. It or its end products are destroyed or changed by heat, as in smoking, cooking, or canning. Nitrate withstands these changes and serves as a source of nitrite. The pickle used in curing meat develops an acidity during cure of about *p*H 6. It may be as low as 5·8, but 6·2 is perhaps more typical. At this acidity nitrite colours meat rapidly, but is itself rapidly changed so that a considerable part of it cannot be found by the usual methods of analysis.

For the reasons just given the mixed cure is increasing in popularity. There are two varieties that seem logical. One is a nitrate cure with small additions of nitrite to give rapid colour fixation. This is similar to the use of some second or used pickle in starting the cure of a new batch of meat. The other is a nitrite cure with modest additions of nitrate to serve as a stabiliser or a source of further nitrite as the nitrite originally present disappears, a sort of anchor to windward.

Lard Problems.

Lard has long been the standard shortening agent and cooking fat for household and general use. There are various kinds of lard yielded by different tissues or by different methods of treatment. Thus open kettle-rendered lard has a distinctive flavour resulting from the method of rendering. The fats used are the leaf fat and back fat of the hog. Lard made solely from the leaf fat is called leaf lard. It is somewhat harder or firmer than lard made from carcass or from cutting fats. This is due to the fact that the melting point of a fat laid down on the animal body during fattening depends upon the location, or the temperature which varies with location, being greater in the abdominal cavity than on the surface of the carcass.

Kettle rendering of fatty tissues at relatively low temperatures yields a fine quality product, but it is apt to give low yields, especially from those tissues not so high in fat content as leaf fat and back fat. In order to obtain economical yields from miscellaneous fatty tissues of the hog, lard is rendered in closed tanks under steam pressure. The resulting product is prime steam lard, which constitutes about 80 per cent. of the lard produced in the United States.

Prime steam lard is a high grade standard article of quite uniform quality. The quality will vary within limits, however, depending upon prompt handling, proper rendering, method of refining and conditions of storage of the finished product. Also the type of fat that predominates may affect the quality. In the case of the larger producers of lard there may be much more uniformity than in the case of smaller producers or those who have chiefly killing fats or cutting fats.

Fatty tissues intended for lard should be quickly chilled and kept cold until ready for rendering, should be kept clean and free from all contamination, should be promptly rendered at a temperature that is not too high, and should be rendered free of moisture and residual tissue. The rendered fat should be protected from contamination with lower quality

fats, which might remain in pipes or vats to be used, should be kept free of such catalysers as metals or oxides of metals, and should be stored in a cool, dark, dry place in proper containers.

The process usually known as refining is really a process used to give a lighter colour to the lard. The colour will depend upon the source—whether a killing, cutting, or pickle fat—and upon the method and temperature of rendering. Fats have a natural colour, which depends upon the animal and upon its feed. The natural yellow colour of such fats as oleo oil or butter is due to carotin and related pigments. Such colour should then be indicative of high vitamin content or of the presence of carotin, which apparently can serve as a source of vitamin A. Consumers prefer a yellow butter. Why should they then be asked to prefer a perfectly white lard or other cooking fat? Is it because some shortening agents on the market are colourless, and so the manufacturer wishes to convince the consumer that whiteness in cooking fats means quality?

Methods used to give a white colour to lards, such as the use of refining or of the picker box, which incorporates air into the lard, do not add to its keeping qualities. This makes little or no difference in the trade, since lards are generally used in breads, pastries, and similar products, which are consumed soon after baking.

Lard stands supreme as a shortening agent. Its plastic range is ideal. Many a manufacturer of other shortening agents would give a large sum of money to be able to equal this quality of lard. Lard is satisfactory for frying. In addition lard has a distinctive and well-liked flavour. Quality is uniform within each type. There are, however, certain fats such as the sweet pickle fats—that is, fatty tissue from pickle-cured meats—which cannot be rendered while fresh, since they become available only after the cure has ended and the cured product is being trimmed. Such fat presents a special problem. The rendered product is higher in free fatty acids than is desirable in a good lard. Until recently the renderer of lard could correct this condition by means known to and used by every manufacturer of vegetable shortenings. The lard manufacturer may now refine such lards by the use of suitable caustic solutions, and he thus reduces the free fatty acids to a point required in high-grade lards. This process also raises the smoking point of such lard over 100° F. The keeping qualities are not affected much one way or the other. However, a good grade of lard results from such treatment, and so the average standard of lard is raised.

The feeding of oily feeds such as soy beans and peanuts to hogs is very apt to cause a soft or oily fat to be laid down on the animal's body. The practice of using these feeds is frowned on by the packer. Nevertheless, the farmer in certain parts of the country may find it economical to use such feeds. Consequently the meat packer obtains some lard that is too soft for satisfaction. This type of lard may be subjected to hydrogenation, and thus made harder and satisfactory for use. The process is, of course, not new, having been long used in hardening cottonseed oil and similar fats. Its application to certain lards is new, and permits the manufacture of a good quality shortening from lard that would otherwise be too soft. At present such hydrogenated lards are sold under special names and are not marketed as lard.

The various processes or methods of handling just discussed show what problems the lard producer has faced and what he is doing to solve the problems and make lard, now a good standard product, still better.

View of a Modern Hog-Killing Floor Showing Various Steps in the Preparation of the Carcass.

(Courtesy of the National Provisioner, Chicago.)

The Preservation of Meats in Tin and Glass Containers

By A. SAMSON, A.R.C.S., A.I.C.

In a series of articles of which this is the first, the author discusses in plain language the requirements, both scientific and practical, that are essential to the successful preservation of meats in tin and glass containers, emphasising those particular points which need careful control and observation, and which are apt to be overlooked—especially by those who do not possess a chemist or laboratory. Subsequent parts will deal with processing, cooling, packing, etc.

PART I

THE PRESERVATION of meats and meat products by heat treatment has been practised in this country for many years, but it is unfortunately the case that many of the ideas and methods of to-day are no further advanced than those of 20 to 25 years ago. Meat preservation is a scientific subject, and should be treated as such. Science plays as important a part in the processing of a tin or glass of meat product in a retort as it does in the brining of meats —with this difference: the former problem is one of physics, while meat brining seeks the aid of bacteriology and biochemistry.

Every phase of the process of meat preservation by heat treatment can be treated as a scientific problem. By so doing, and working along scientific lines, success is bound to follow, thus bringing better results to individual firms, and prosperity to the industry as a whole. It must be realised that prejudice against the tinned or "glassed" meat products of a particular firm may seriously affect the sale of a similar product of other firms. The "Loch Maree" potted meat tragedy was a glaring example of such widespread loss of business.

The Refrigerator.

In a meat-preserving factory the refrigerator may be looked upon as the commencement of operations. In this country most of the preserving houses buy their tongues, briskets, veal, etc., in the frozen or chilled state. These may be used within a few hours of arrival, or else stored as received until required.

Unfortunately, the refrigerating department is one of the most abused. Workers generally look upon the refrigerator as the general storehouse for any and all meats which are lying about, or which are awaiting storage, examination, cooling, or a convenient time for treatment. A refrigerator is almost always taxed to its utmost capacity, and is very often overtaxed.

Remember, a refrigerator in a meat-preserving concern is not to be looked upon as a storehouse, but a "holding" house, where stocks can be kept for a few days prior to treatment. It is not to be considered as a department for preserving the meat for all time. Consequently, if not handled carefully, a refrigerator is liable to be so abused as to raise the temperature above the safety factor. The refrigerator temperature should be such as to render the troublesome bacteria dormant. As soon as this temperature is exceeded the bacteria become active. Hence there is not much object in attempting to freeze again meat that has been thawed previously. Such thawed meat should be dealt with and brined. In the same way, workers have a very bad habit, during summer, of trying to cool off hot packed meats by placing them in the "cooler" of the refrigerator—to the detriment of the whole system. A refrigerator is not a "cooling house."

More damage is done by an overtaxed refrigerator than is realised. Practically every concern knows what a "friggy" odour is, and once the meat has this odour it is common knowledge that it will never be free from it. "Friggy" odours are due to bad refrigerator organisation. Therefore use a refrigerator as a cold store.

The writer has often seen meat from animals which were killed in the morning being unloaded from vans after travelling about all day in an exposed and unfrozen condition and then placed in the refrigerator. This is a dangerous practice, and such meat, besides upsetting the refrigerator temperatures, is liable to be heavily contaminated, and therefore is a source of infection to other meat in the refrigerator.

Such meat should be washed immediately and placed in the brine tanks, or, if this is not possible, should be washed and then placed overnight in cold, fresh, strong brine, so that it can then be treated next morning. It is often the case that such meat is placed in brine which has been used several times, the filth and bacterial content of which is already disgracefully high.

Use your refrigerator judiciously; do not overtax it—otherwise this will be a costly department.

The Brine House.

The brine house is one of the most important departments of a meat-packing concern. Its condition, its personnel, and the methods adopted can result in either success or failure.

To many engaged in the industry thoughts of a brine house immediately bring visions of a cool, dark cellar, full of dirt and cobwebs, in which the air is stagnant and very damp. This is all nonsense. The ideal brine house is one which is perfectly clean, bright, light, and has a temperature of preferably between 38° and 45° F. The air should be pure and fresh, and as free from organisms as possible.

Due consideration must be given to the construction of the brine house itself. The minimum amount of wood should be used. The walls may be tiled with white glazed bricks, or else, if made of ordinary brick, should be frequently and well whitewashed. The floor should never be made of wood, the best material being concrete with a smooth surface. There should be a fall in the floor with a pitch of about 2 inches to every 10 feet. No part of the concrete floor should be more than 10 feet from any drain, and it should be absolutely free from pot-holes, where brine can collect. The drains must be large enough to carry away all the liquid from the department, and, furthermore, should be easily accessible in case of any stoppage.

The construction of the brine tanks is a very important matter. Wood must never be used, for bacteria penetrate wood, with the possibility that subsequent brines may become infected. Brine tanks may be made of several materials. Slate tanks have been used for years and are quite satisfactory, but after a few years' use they tend to develop leaks which are very difficult to seal.

Tanks made of glazed bricks are excellent. They always present an hygienic appearance and function quite satisfactorily. Tanks may also be made of ordinary brick which has been faced inside and outside with waterproof cement. These are very useful and last for years.

The floors of all brine tanks should slope to an outlet at one corner which can be made of stainless steel pipe. When washing out brine tanks it is advisable to use clean hot water containing a little sodium hypochlorite solution. The tank must then be thoroughly rinsed out with clean cold water, and there must be no trace of chlorine after rinsing.

Brine Ingredients.

The purposes of brining of meats are well known, so that it is proposed to deal now with the ingredients that make up a brine.

(*a*) *Water* for brine must naturally be of drinking purity. It should be cold and as free as possible from mineral salts such as carbonate and sulphate of lime. As most manufacturing concerns use public water supplies, this point is not usually a troublesome one; but in those cases where the supply is obtained from wells, pools, etc., it is advisable that a thorough bacteriological and chemical analysis be made at intervals in order to insure that the water is safe. It is essential to have the water cold, so that when the meat is placed into the brine temperatures will not be too high.

(*b*) *Salt*.—There are various grades of salt, from the commonest or rock salt to the purest or stoved vacuum salt. The difference is due to a larger proportion of impurities in the commoner salts, which consist mostly of sulphates of calcium and magnesium. It is thought that these impurities have an undesirable influence on the flavour of the brined meats, imparting a slight bitterness, but this is difficult to prove conclusively. However, it is certainly true that these impurities produce undesirable results in meats packed in glass. A high mineral impurity in salt is very liable to assist the formation of "white foots" in glasses of tongue, etc.

When meats are brined at low temperatures, the slow penetration of the salt carries with it the calcium impurities, and later these show in the glasses as a deposit of calcium phosphate and carbonate, etc.

It is also important to remember that the commoner salts have a high bacterial content, which may prove troublesome. Owing to the temperatures involved during manufacture, the finest salts—that is, the stoved vacuum salts—are practically free from bacteria. Hence it is recommended that for high-class work, especially in the preparation of glassed foods, only stoved vacuum salt of 99·5 to 99·7 per cent. NaCl should be used. Never use rock salt or solar salt.

In preparing brines use a salinometer, and see that all the salt is dissolved. Remember that 4° salinometer reading is the equivalent of 1 per cent. salt concentration. Hence 100° salinometer is equivalent to 25 per cent. salt, which is approximately saturation point.

(*c*) *Sugar*.—Many concerns use sugar in their brines. It is questionable whether, in the quantities used in this country, the addition of sugar has much effect on the flavour. It has been thought that sugar in brine has sometimes been the indirect cause of meat spoilage, but this is a difficult statement to prove. Certain it is that many sugars are highly contaminated with a class of sporing organisms known as thermophiles. However, as a result of recent research work in America, it has been found that the environmental conditions of such spores in canned meat products have an inhibitory influence on these thermophiles, so that they do not appear to be as dangerous as one would imagine.

Nevertheless, it is to be recommended that no cheap unknown grades of sugar be used. Only the best quality, free from sulphur dioxide and colouring matter, especially ultramarine, should be purchased.

(*d*) *Saltpetre*.—There are two types of saltpetre—sodium nitrate and potassium nitrate. Either type can be used, but it must be remembered that sodium nitrate is the more powerful of the two, as it contains the greater proportion of "nitrate" content. Both nitrates function in the same manner during curing. Which particular salt to use is a question that may be left to the individual curer to decide so long as it is appreciated that the sodium salt is the more powerful.

Sodium Nitrite.—During recent years a new curing agent has received a great deal of attention—this is sodium nitrite. Research work on the science of curing has proved that sodium and potassium nitrate as such are incapable of producing any curing action. It has been established that the first step in the curing process is the reduction of nitrate to the nitrite salt, a change which is brought about by the bacteria present. The sodium or potassium nitrite then performs the function of imparting colour to the meats. It was a natural result of this investigation that the nitrite salt be added direct to the brines in place of nitrate, and this immediately met with great success, a much more rapid and definite curing action being obtained. Nitrite curing certainly has many advantages, but it is well to issue a word of warning: unless its use is carefully controlled it is liable to do more harm than good.

Nitrite curing has been used in America with suc-

cess for many years. Most of the meat-packing concerns have brine houses whose temperatures are kept low (at about 40° F.) and, furthermore, are thermometrically controlled.

In this country temperature conditions in brine houses are not so satisfactory. There are, indeed, very few concerns which control the temperatures of their curing departments within narrow limits, and there are still fewer concerns which possess brine houses with temperatures lower than 50° F. except, perhaps, during extreme wintry weather. Curing departments are generally at temperatures between 45° and 70° F., and are more often in the upper region than in the lower. The writer has been in some brine houses which have possessed temperatures of 70° F. and over during the summer months.

It is in these high-temperature curing houses that the use of nitrite is apt to prove dangerous. Nitrite acts rapidly: in warm brines it is apt to commence fixation of colour so rapidly that the surfaces of meat may, after cooking, turn out a dark red, almost brown or even black colour; one does not obtain that delicate pinkish colour desired in ox tongues, for example, especially those packed in glass.

Nitrite in excess is likely to produce the same results; moreover, warm brines are liable to be turned a green colour by use of excessive nitrite.

The writer is very much in favour of the use of nitrite for curing purposes, but for successful application its powerful action must be appreciated, and therefore careful control as to the amount employed is advisable.

Spices and Herbs.—In this country very few concerns use spices or herbs in their brine. Some may use bay leaves for briskets, but the general practice is not to use them, and then merely for the purpose of imparting a particular flavour.

The Curing Process.—Before placing meats in brine they should always be washed or sprayed; this is common sense. In the case of frozen meats, such as tongues, this may not always be absolutely necessary, as they are cleanly packed, but it will be noticed that during the course of handling in the factory they become contaminated by human hands, sometimes none too clean; the tongues contain saliva, briskets may be slimy, and fresh-killed meat may contain much blood and even dirt. Wash and spray such meats if you desire clean, pure products free from spoilage.

Having placed the meats in brine, see that they are all well immersed. It is a good plan to turn the top layers over daily, and also to move the remainder of the meat in the tank gently; this ensures all the meat being thoroughly and evenly brined.

(To be continued.)

Herring Trade

MR. W. KEIR, Inspector of Sea Fisheries, has recently issued his 1930 report on the herring trade on the Continent, following his last visit of inspection. We would recommend this report to everyone interested in the fishery industry. In 1929 the production of salt herrings in the five principal herring-producing countries was as follows: Scotland, 1,109,234 barrels; East Coast of England, 687,697; Netherlands, 591,576; Germany, 254,402; Norway, 840,686; total, 3,483,595 barrels. About 90 per cent. of the Scottish production is exported, about 40 per cent. going to Germany, 30 per cent. to Danzig and Poland, 20 per cent to Latvia, and the rest to Estonia, Finland, Holland, Sweden, and Lithuania. We send more cured herrings to Germany than she produces herself. Last year there was a drop in the production, both in Scotland and in Europe generally—except in the case of Norway, who is exporting increasing quantities of her cure to Soviet Russia. This falling off is ascribed to restricted demand occasioned by depressed economic conditions in 1930 as compared with the previous year.

Mr. Keir notes that in most of the continental herring markets Dutch and German herrings are now competing with British herrings, and it is likely that further competition will in future be met with from Iceland herrings cured as Matjes, as well as from the surplus of the German herring trawling industry put up in a cured state. There is a danger that an increasing quantity of cheaper herrings from other countries will be taken in place of the superior, but more highly priced, British cure, owing chiefly to the reduced purchasing power of the population.

What we want now, to supplement this admirably executed report, is a survey of the home market and an exploration of the ways and means of increasing home consumption.

Fruit Products Display

ON January 9, at the Fruit Products Laboratory, Berkeley, California, an interesting conference and display of new fruit products, particularly "frozen pack" products, was well attended. Several short papers were read, among which may be noted: "Orange Juice and the Dairy Industry," by F. Fisher and Mr. Baker. "Observations on the Freezing Storage of Figs," by Dr. W. T. Pentzer. "Utilisation of Prunes in Ice-cream," by E. Mrak. "Canned Fruit Specialities," by E. L. Macabee. "Fruit Specialities and Fruit Surplus," by Professor W. V. Cruess. "Commercial Experience with Citrus Products," by F. W. Bireley Co. "Freezing Storage Investigations," by M. A. Joslyn and G. L. Marsh. "Experience in Establishing Freezing Storage Plants," by F. J. Hibbs.

The Bacteriology of Common Salt

By WILLIAM CLAYTON, D.Sc., F.I.C.
Chief Chemist and Bacteriologist to Messrs. Crosse and Blackwell, Ltd., London.

A series of articles reviewing present knowledge in relation to the bacteriological action of salt.

PART II.—THE ISOLATION OF HALOPHILES

TRUE HALOPHILIC micro-organisms are encountered in red dried salt fish (so called "pink" or "pink eye"), matured anchovies, salted hides, and certain sea-water samples, whilst all solar salts so far examined by the author have yielded such strains. In all the above the origin of the halophiles is sea-water. That air or bird fæces sometimes carry micro-organisms which are at any rate facultatively halophilic seems probable from the author's experience in isolating a puce-coloured coccus from saturated brine in an open-air large salt pan exposed unheated several months during the summer of 1925. This coccus grows abundantly on culture media saturated with NaCl.

Special Culture Media.

Culture media for the isolation of halophiles have been described by Harrison and Kennedy,* Cloake,† Clayton, and Gibbs,‡ and recently by Miss Robertson,§ who used a modified Clayton-Gibbs technique.

Miss Robertson's method has yielded good results, and is as follows: 1 litre of water and 1 lb. minced fresh cod are left in soak overnight and then strained through muslin. In the liquor are dissolved 30 per cent. NaCl and 0·01 per cent. peptone, the volume being finally restored to 1 litre. The *p*H is adjusted to 8. This fish broth is the basis, and for use in Petri dishes is made solid by mixing in 30 grms. of rice flour per 100 c.c. broth. The soft paste is poured into Petri dishes and autoclaved at 110° C. for 15 minutes.

Where the equipment is available, the present writer recommends the method employed in his laboratory: 1 lb. of minced cod is digested with 1 litre of water, and to the mixture are added 20 per cent. NaCl and 0·1 per cent. peptone. The *p*H is adjusted to 8·2. 300 grs. of ground rice are now added and the whole mass passed through a colloid mill. Retention of the fish fibre and of the proteins precipitated by the *p*H adjustment is thus secured, and a remarkably successful medium results. After sterilisation a white matt surface ensues and the medium is suitable for tube slants or for Petri dishes.

The fact that the medium only contains 20 per cent. NaCl renders it specially suitable for the examination of solar salts, since crystals of these placed on the medium dissolve and permit bacterial development. Incubation at 37° C. or at 42° C. (optimum growth) causes evaporation of moisture, and eventually pure NaCl crystals appear. If desired, this may be avoided by adequate sealing of the tube or Petri dish.

Medium for Non-Chromogenic Strains.

Although hides, fish, and solar salts yield yellow, pink, red, and purple colonies on the above media, it is sometimes required to isolate non-chromogenic strains particularly from brines used for pickling vegetables and meats. Clayton and Gibbs found the following medium very suitable: 1 lb. minced cod is digested in 1 litre of water and filtered (broth A). 25 grms. of rice or potato are digested in 1 litre of water and filtered (broth B). Equal parts of broths A and B are mixed and used as solvent for agar powder (2 per cent.), NaCl (20 per cent.) and peptone (0·1 per cent.). The *p*H is adjusted to 8·2, the mixture heated to 110° C. for 15 minutes and filtered. On cooling, a clear and nearly transparent jelly results, which can be employed as tube slants or for Petri dishes.

So far as the writer is aware, no one has described anaerobic halophiles, although work on these is in hand in his laboratory. The great majority of true halophiles seem to be obligate aerobes, a fact readily demonstrated in striking fashion. Harrison and Kennedy employed a sterilised NaCl codfish broth containing a strip of filter paper half in and half out of the liquid. Red growth of halophiles was demonstrated *above* the water-line. Again, a piece of cotton-wool saturated with NaCl codfish broth and squeezed free of liquid, will, after sterilising in a boiling tube and being inoculated with solar salt, become pink throughout its entire mass. Finally, potato cylinders are soaked overnight in saturated brine, drained, and then soaked in NaCl fish broth. Place in Roux tubes over NaCl fish broth and sterilise. Excellent growths of halophiles follow suitable inoculation.

"Rust" on herrings seems to be a peculiar result of the action of obligate aerobic halophiles, the fat in the exterior cells of the fish becoming rusty-brown and very rancid.

* *Trans. Roy. Soc.*, Canada, **16**, 101-152 (1922).
† Food Investigation Board, Special Report, No. **18**, 1-23 (1923).
‡ *Analyst*, **52**, 395 (1927).
§ *J. Hygiene*, **31**, 84-95 (1931).

By-Products from Glands

By THOMAS McLACHLAN, A.C.G.F.C., F.I.C.

What might easily be an important and profitable side-line of the British meat industry is being strangled by sheer neglect and stupidity. The raw materials for special animal by-products, the manufacture of which is growing rapidly, are being obtained from abroad, although home supplies are more than ample for the purpose. The author discusses the position as it is to-day and indicates the steps that must be taken to remedy existing absurdities; why these should be tolerated at all is beyond our understanding.

ANYONE ACQUAINTED with the large amount of gland and animal products on the market for medicinal purposes must be greatly surprised at the small quantity of raw material entering into their composition which is obtained from home-killed animals. There are doubtless several reasons for this, not the least being that while medical science in this country is watching the development of organotherapy with the greatest interest and taking its fair share in the research carried out on the subject, it cannot be ignored that the majority of British pharmacologists still view many of these preparations with considerable scepticism.

The purpose of this article is, however, not to discuss the pharmacological properties of gland substances or their therapeutic action, but to point out that there is a considerable demand for them, both by doctors and by laymen, and that this demand is being met by the importation from abroad of the product itself or the raw ingredients thereof. In order to emphasise the truth of this statement, mention may be made of a conversation with the sales manager of a large continental house, who was of the opinion that there was only one British competitive firm, and this was not to be taken seriously, in the manufacture of organotherapeutic products. This gentleman also pointed out the enormous profit which it is possible to make on these products, and remarked that, although his firm made 80 per cent. profit, their goods were only half the price of those of their competitors, and that, in consequence, doctors thought these must be inferior. His directors had, therefore, been obliged to increase their charges still further to counteract this opinion, a method of procedure which they considered dishonest.

Most of the glands employed for medicinal purposes belong to that part of the animal usually considered as offal, and include the brain, heart, intestines (including the duodenum), interstitial glands, kidneys, liver, lungs, various lymphatic glands, mammary glands, ovaries, pancreas, parathyroids, pineal body, pituitary gland, placenta, prostate gland, salivary or parotid glands, spleen, stomach (including the pylorus), submaxillary glands, suprarenals, testes, thymus, thyroids, and tonsils. Besides the glands, blood is employed in the production of blood albumin and fibrin, hæmoglobin, kephalin, and plasma; there is such a large demand for the red bone marrow from calves that it is frequently obtained from older animals as well; spinal cord is employed; extracts are prepared from muscle and skin; ox gall is required for the separation of the various bile acids; and gall-stones themselves are utilised.

As some readers may not be acquainted with the exact location of all these glands, illustrations are shown marking the various sites in the body which they occupy, and also giving the kind of animal from which they are taken. It may be mentioned that the only glands likely to present any difficulty are the parathyroids and the pineal body. In some animals the parathyroids are situated in the thyroids, in others some are internal and others external; they can be distinguished easily while the body is warm, but once it has cooled it is usually impossible for anyone but the expert to identify them, and, as a result, manufacturers frequently receive a fair proportion of pieces of thyroid gland and have to make stringent microscopical examinations of all supplies. The pineal body is a tiny gland situate in a small case at the base of the brain and weighs about one hundredth of an ounce in a fully grown ox, one two hundred and eightieth of an ounce in sheep, and only one three hundredth of an ounce in calves, so that, unless the head is opened carefully, there is a possibility of smashing it completely.

Availability of Material.

It is sometimes contended that the chief reason why so many foreign glands are employed is that very little material is available in this country, but this argument is entirely fallacious. At a rough estimate there are probably about 2,000,000 cattle, 3,000,000 pigs, and 5,000,000 sheep slaughtered in this country every year, and it may be stated with certainty that half this number of animals would supply all the gland requirements of this country. Although the demand for these preparations is ever increasing, research is making such strides that better methods of extraction and administration are continually helping to keep down the necessity of using more raw material.

Cost of English Glands.

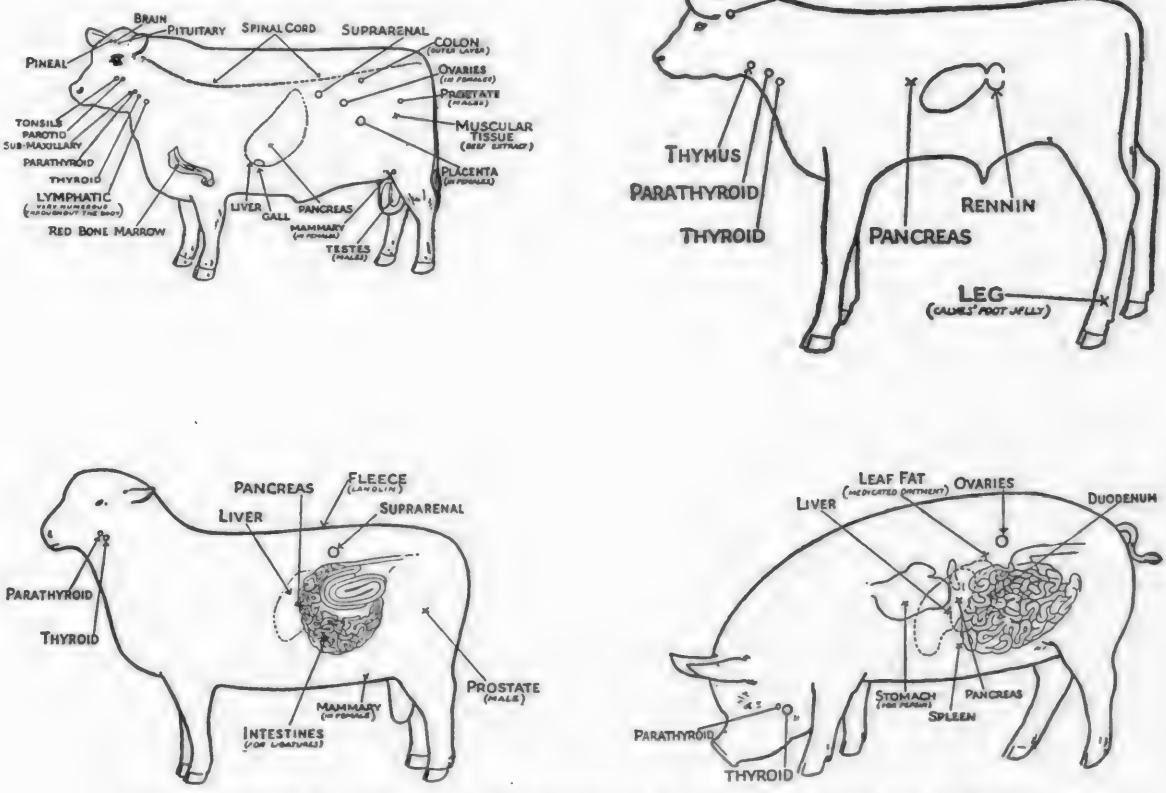
One reason why English glands are used to such a small extent is that offal merchants require too high a return on their outlay for the trouble which they take in separating the material. When liver treatment was first introduced for pernicious anæmia, the author handled about two tons of liver a week, all of which was obtained from America; the cost varied from 5d. to 9d. per pound, while English liver was commanding 1s. 3d. to 1s. 10d. per pound, a rate which did not allow manufacturers to use it and sell the extract at competitive prices. As another instance mention may be made of pituitary glands,

which yield, to all intents and purposes, the same physiological activity, whether they are imported or fresh, provided they have been frozen immediately after their removal from the animal. The price for an imported pituitary gland usually works out at about ½d. as against 2½d. for the English article. The same remarks could be applied to almost each of the other glands, but sufficient has been written to illustrate the point.

Collection of Glands.

It must be admitted that the facilities for collecting glands are much greater in the Argentine, Australia, New Zealand, and the United States, where animals are slaughtered in large numbers at a time and the carcasses are frozen or chilled almost immediately. In these countries the slaughterer has to make the most of the material at his disposal, and having cold rooms he divides up the carcass rapidly in order to isolate every portion which has a market value. As soon as the glands are removed they are placed on shelves in cold rooms and frozen separately, with the result that on arrival in this country they still retain the shape formed during freezing. This is in marked contrast with the author's experience in this country, and he remembers vain efforts made by a firm in the North to obtain pancreas in a condition suitable for the manufacture of insulin. Owing to transport difficulties it was impossible to bring the glands to the factory on the Sunday evenings, and attempts were made to induce offal merchants to place them separately on shelves in the cold rooms attached to the abbatoirs overnight, so that they should be thoroughly frozen by the Monday morning. As a general rule they were found the next day thrown together in a sack and still warm, with the result that eventually attempts to manufacture insulin at that particular factory had to be abandoned.

In America it is the custom to start operations in the slaughter-house, all glands being collected by the manufacturer's own employés, who place them in weak, cold alcohol or freezing chambers, according to the purpose for which they are to be used. Owing to the methods adopted in abbatoirs in this country this procedure is impossible, all entrails being sold to offal merchants, who insist on dividing the spoils according to their ideas; but if better arrangements can be made abroad, the owners of British slaughter-houses will have to fall into line to meet the competition. Every farm near Paris is now equipped with a *frigorie*, so that all milk and perishable articles may be cooled immediately; surely it is not too much to suggest that British slaughter-houses of appreciable size should be similarly fitted in order to freeze glands and similar material immediately they are isolated.



Diagrams showing, in a general way, the Positions of the Glands and Tissues used in Medicine.

(From Rudolf A. Clemen's "By-Products in the Packing Industry.")

Advantages of Fresh Materials.

Work has recently been carried out on the deterioration of meat on storage, and Lea and Haines at the Low Temperature Research Station at Cambridge have shown that bacterial growth is not inhibited even at −5° C. (23° F.), but that if meat is to be stored successfully it must be cooled to −10° C. (14° F.) immediately after killing and kept at that temperature. Moran and Smith of the Food Investigation Board state that all meat must be cooled immediately to about 0° C. (32° F.), but all workers find the same results with normal storage—namely, that decomposition and hydrolysis of protein is continuous. Where no attempt is to be made to purify the extract this may be more or less immaterial, provided there is no simultaneous reduction in the required activity; but where an extract is to be prepared for hypodermic injection it is essential that as little decomposition as possible should take place, since every increase in the amount of soluble protein means additional difficulty to be overcome in the way of purification, or, alternatively, more risk of causing a protein reaction in the patient.

In connection with the recent work of Harington on the separation of thyroxine from thyroid glands, much has been said and written about the high thyroxine content of British glands; but, in the author's opinion, much more might be said about the treatment of the glands employed by Harington, since, to the best of his belief, Harington used fresh glands which had been desiccated entirely below the freezing point, whereas the way in which frozen thyroid glands are usually handled in drying is probably sufficient to hydrolyse a considerable portion of the thyroxine itself.

Jam Standards

In view of the present interest in the establishment of standards for jam, the following has been abstracted from the Annual Report of the Analyst for the County of Lancaster, compiled by G. D. E. Elsdon, B.Sc., F.I.C.

SIXTY samples of jam have been received during the year, of which two have been certified as being adulterated. These two samples, an informal and a formal sample respectively, obtained from the same vendor, contained 20 per cent. of apple jam. The vendor was a small shopkeeper who had obtained no guarantee. A prosecution was instituted, and owing to the fact that it was not possible to institute any proceedings against the real culprit, in this case the manufacturer, a nominal fine of 10s., including costs, was imposed.

For some considerable time past the Jam Section of the Food Manufacturers' Federation has been endeavouring to lay down suitable standards for commercial jams. The Section has been assisted in its deliberations by a Committee of the Society of Public Analysts, of which Mr. G. Elsdon was a member. A report was published by the Food Manufacturers' Federation towards the end of the year, in which it was stated that standards had been fixed for first and second quality jams. These standards suggest that all jams should contain not less than 68½ per cent. of total soluble solids as determined by the refractometer. The fruit content of the first quality jams is allowed to vary from a minimum of 30 per cent. in the case of blackcurrant, to 45 per cent. in the case of cherry, whilst a uniform percentage of 20 is suggested as a minimum for all jams of the second quality. The addition of certain fruit acids, of colouring matter, and, to first quality jams, of fruit juice and/or pectin need not be declared. It was considered by the Committee that so long as the actual fruit content was high, the addition of a small amount of vegetable thickening material to make the jam suitable for transport was not sufficiently undesirable for it to be prohibited.

The suggestions have been somewhat severely criticised in several quarters. Whilst it is not contended that they are perfect, they are at least the expression of a sincere desire to grapple with a most difficult situation. They were arrived at after a very full and careful examination of the whole of the facts.

No improvement is likely until the problem is attacked by those whose decisions will have legal weight.

During the quinquennial period, 243 samples of jam have been examined, of which 12 have been returned as adulterated. Eight of these contained foreign fruit, three contained glucose syrup when the label claimed that the jam was prepared from fresh fruit and pure sugar, and one contained more sulphur dioxide than is allowed by the Preservatives Regulations.

Many of the samples have been examined for their optical rotation both before and after inversion, in 10 per cent. aqueous solution in a 200 mm. tube. The direct reading with mercury green light has varied between +6·55° and +0·11°, and the invert reading between −0·30° and −3·56°. The percentage of total sugars as given by the refractometer has varied between 58 per cent. and 74 per cent. In certain cases the amount of insoluble solids has been determined. The following are some of the results which have been obtained with single fruit jams:

INSOLUBLE SOLIDS IN JAM (PER CENT.).

	Number.	*Average.*	*Highest.*	*Lowest.*
Blackcurrant ...	10	2·15	2·98	1·29
Strawberry ...	20	1·31	2·28	0·59
Raspberry ...	11	1·85	2·60	0·72
Apricot	4	1·25	2·76	0·68
Damson* ...	13	0·88	1·73	0·49

* Without stones.

The Society of Food Industry

We are requested to announce the inauguration of the Society of Food Industry. This is one of the most important events in the history of food manufacturing. The suggestion has been remarkably well received and there is every indication that the Society will have a most successful and useful career. Below is outlined the main considerations which have led to its inception.

THE FOOD industry ranks first in importance among manufacturing industries. It is the one most vital to the community; it is also one of the largest, but is probably more complex in structure than any other industry; for it embraces, to name only a few examples, the manufacture of such important products as bread, flour and sugar confectionery, chocolate, jam, pickles and sauces, and canned or preserved fruit, meat, and fish.

Yet, in spite of this apparent diversity among the component parts of the food industry, they are closely linked together and have much in common. The raw materials are agricultural products, and hence the industry as a whole is bound up with agriculture. Furthermore, the raw materials, and also the finished products, are prone to spoilage; thus biochemistry and bacteriology are the basic sciences, and the application of these constitutes the keynote of the technical control of food processing in every branch of the industry. The raw materials, singly or compounded, pass through various processes which have two main objects—namely, to stay the natural course of spoilage and to render them more palatable. Then, again, the products are all intended for human consumption, and hence, in this respect too, the various branches of the industry are governed by the same broad considerations of purity, digestibility, nutritive values, and so on.

In view of the conditions outlined above, the food industry, of all industries, is the one most needful of an instrument for co-ordinating its component parts. Yet it is, strangely enough, the very one that lacks such an instrument. The textile, steel, non-ferrous metals, fuel, petroleum, chemical, glass, and pottery industries each has its own co-ordinating institute or society, and so it is for every other industry. Why the most important and needful of all should be the unhappy exception is an amazing spectacle in these times of organised effort. When one realises the enormous amount of overlapping and duplication of individualised work that is inevitable under these conditions, one is surprised that any material progress should be made at all. Not only this, but the accumulated knowledge and experience of one branch of the industry are as much isolated from the other branches as France is from Spain, and for infinitely less reason, for there is no natural barrier.

Since, therefore, all sections of the food industry are on common ground, are grappling with much the same fundamental problems, and are governed by the same basic laws, nothing can be more obvious than the fact that the progress of the whole is dependent on the progress of its parts. The most effective way of retarding both general and individualised progress is by hindering interchange of ideas, knowledge, and experience between the various sections, and this is virtually what the existing lack of co-ordination is doing.

It is true that this journal is doing much to open up these channels of intercommunication, and its work is appreciated in all parts of the world by every branch of the industry. But this is not enough. The element of personal contact, and with it the corporate spirit, is lacking. Prompted by these considerations, various of our readers have approached us with the suggestion that a Society of Food Industry be inaugurated having as its general aim the promotion of the interests and welfare of the food industry as a whole and, more specifically:

1. To arrange for the delivery of lectures and the reading of papers, and for the holding of special conferences.

2. To form a reference library of books and periodicals.

3. To promote the better education of persons desirous of becoming food technicians, either in a consulting capacity or in responsible positions in the industry.

4. To raise the status of the food technician by aiming at a high standard of scientific and practical proficiency.

5. To encourage research on problems relating to the production of foodstuffs.

Needless to say, we are ready to give our full support to this admirable project and to undertake the work of correspondence and organisation until the Society is able to stand on its feet and manage affairs for itself.

Some may be doubtful that such a society can be formed and maintained. There is nothing unusual in this attitude: the same doubt has been voiced at the time of the founding of most societies and institutes representing other branches of industry—but they have prospered and done exceedingly useful work in spite of these early misgivings.

Those engaged in industry have come to realise

Readers who are interested may send their names to The Editor, who will supply particulars of membership, etc., as soon as these are available. Every effort will be made to keep the subscription as low as possible. The date of a general meeting to elect the Council for transacting the affairs of the Society will be announced shortly.

more and more that progress can best be achieved by interchange of experience and knowledge. This does not mean that firms run the risk of having disclosed what they consider to be "secret processes," "family recipes," and so on. These do not affect the industry as a whole, and count for very little so far as general knowledge and scientific methods are concerned. In any case, under modern conditions it is impossible for any "secret" of far-reaching character to remain secret for long. Greater advances are made by coming out into the open than by hiding in a dark corner. The essential requirement, especially as regards the young men of the industry, is a thorough grasp of the scientific principles involved, and out of this will result a critical, receptive mind open to examine and possibly adopt any new ideas which might appear to effect an improvement in customary practice. Efficient organisation, up-to-date plant, deep and wide knowledge based on exact data coupled with the right practical experience, the open yet critical attitude towards new ideas and new knowledge, an appreciation of scientific research and an ability to interpret and adapt its results, and a generally optimistic and go-ahead spirit—these are the things that determine progress.

It is the firm conviction of many—including ourselves—that an association on the lines we have indicated will be a powerful factor in materialising this ideal of progress with the minimum of wasted effort.

Fish Meals

Studies on the Nutritive Value of Fish Meals

EXPERIMENTS have shown the superior nutritive quality of fish meals in animal feeding. It has been clearly demonstrated that the method by which these meals have been manufactured plays a rôle in their nutritive value which cannot be overlooked and is apparently (at least in so far as was here studied) a more important factor than the source of fish from which the meal is prepared. The question naturally arises: What are the changes brought about during the preparation which render some products inferior to others? This is only one of a number of questions which these experiments have presented, and any one of them warrants detailed study. For example, granted the superiority of certain of the meals over others, what are the differences in the cost of production in the case of each, and can additional manufacturing costs be offset by sufficient superiority in the feeding value of the meal produced? Again, these experiments leave no doubt in the observer's mind regarding the superiority of fish meal over meat products. Wherein does this difference lie? Is there a lack of sufficient quantities of some dietary essential or is it present in some form which cannot be utilised by the animal body? Or perhaps there is the formation of some toxic substance which counteracts the beneficial effects of the meal. These are only the beginning of the interesting questions which remain to be solved.

When it is realised that out of every 100 tons of wet fish there remains roughly 35 to 60 tons, depending on the kind of fish, that may be termed "waste," which, if properly handled, produces a valuable by-product, the importance of this phase of the fish industry becomes apparent. Because of the infancy of this industry, in so far as the manufacture of feedstuffs is concerned, the products have not yet become standardised, a fact which very likely causes the occasional discrepancies found regarding the value of fish meal in animal feeding. As has been pointed out by Clark and Clough (1926), the composition of the same kind of fish may vary with the season or maturity and with the locality in which caught. There may also be an individual variation as well as one dependent upon the portions of the fish body made into meal. However, these differences are small compared with those resulting from variation in the manufacturing process. The careless manufacturer who employs any but fresh, clean, raw material from which to prepare fish meals for stock feeding is ruining his own business, as well as that of his more conscientious fellow-producers, by the sale of a product which rates no higher than ordinary fertiliser. As the industry grows, standardisation of fish meal products to be used as feedstuffs is bound to be brought about by the demands of the consumer to the greatest satisfaction of all concerned. (*By E. P. Daniel and E. V. McCollum. Investigational Report No. 2.* 1931. *U.S. Dept. Commerce. Bureau of Fisheries.*)

Bibliography.

ASHBROOK, FRANK G.: 1917. Fish Meal as Feed for Swine. Bulletin No. 610, United States Department of Agriculture, December 7, 1917, 9 pp. Washington.

ATWATER, W. O.: 1877. Menhaden and other Fish and their Products as Related to Agriculture. In *A History of the Menhaden*, by G. Brown Goode. Appendix A, Report, United States Commissioner of Fish and Fisheries, 1876-77 (1879), pp. 194-267. Washington.

CLARKE, E. D., and CLOUGH, R. W.: 1926. Chemical Composition of Fish and Shellfish. In *Nutritive Value of Fish*, by Harry R. Beard. Appendix X, Report, Commissioner of Fisheries, 1925 (1926), pp. 501-552. Washington.

EDWARDS, F. R.: 1929. Swine Feeding and Quality of Pork. Circular No. 84, Georgia Agricultural Experiment Station, March, 1929, 12 pp. Experiment, Ga.

MANNING, JOHN RUEL: 1929. Crab Scrap versus Meat Meal in Poultry Feeding. Memorandum S-302, United States Bureau of Fisheries, July 18, 1929, 3 pp. Washington. 1930. Fish Meal in Animal Feeding with Bibliography. Appendix XII, Report, Commissioner of Fisheries, 1930 (1931), pp. 371-407. Washington.

ORR, JOHN BOYD, CRICHTON, ARTHUR, and GREEN, J. J.: 1922. The Value of Fish Meal as a Feeding Stuff. *Scottish Journal of Agriculture*, vol. 5, No. 2, April, 1922, pp. 140-157. Edinburgh.

ORR, JOHN BOYD, and HUSBAND, ALFRED D.: 1922. The Importance of Mineral Matter for Growing Animals. *Scottish Journal of Agriculture*, vol. 5, No. 3, July, 1922, pp. 244-250. Edinburgh.

RADCLIFFE, LEWIS: 1920. Fishery Industries of the United States. Report of the Division of Statistics and Methods of the Fisheries for 1919. Appendix X, Report, Commissioner of Fisheries, 1919 (1920), 191 pp. 2 figs., 1 plate. Washington.

WEBER, F. C.: 1916. Fish Meal: Its Use as a Stock and Poultry Food. Bulletin No. 378, United States Department of Agriculture, August 22, 1916, 21 pp. Washington.

Round the Stands at Olympia

A Visitor's Impressions of the Chocolate and Confectionery Exhibition

"BRILLIANT" SEEMS the only word capable of describing adequately the exhibition staged last month at Olympia by the Manufacturing Confectioners' Alliance. There were, according to the FOOD MANUFACTURE representative's reckoning, about 144 stands, and as a few of these were shared by more than one firm, there were consequently rather more than this number of exhibits, every one of which had its point of interest and message to the trade. Olympia, since the Empire Hall extensions were added, is almost bewilderingly large, but it appeared to be hardly more so than was necessary to house the displays comfortably. In view of the fact that the function is only a four-year-old, the whole of the available space may be fully occupied in a few years' time if the present rate of progress is maintained. As Mr. Paul Cadbury said at the luncheon given to celebrate the opening, in previous years it had been the custom to invite some celebrity "from outside" to attend on the first day, but the stage had been reached when it was felt that they might dispense with that. The exhibition certainly now needs no reflected glory.

FOOD MANUFACTURE'S stand, which it shared with its associated journals, the *Manufacturing Chemist* and *Paint Manufacture*, was surrounded on all sides by machinery makers whose names are household words to our readers; and commencing the tour of inspection from our own stand, we first came, literally, to the "silver lining" on Messrs. Brierley, Collier, and Hartley's, or rather to one of their stands, for the firm's exhibits had overflowed on to two. By a new process, our Rochdale friends are able to line and cover all sorts of equipment with 99·9 per cent. of pure silver, and a copper bowl, completely covered with a sheet of silver ¾ mm. thick, was shown as one example of what can be done. It is estimated that, under ordinary conditions of actual use, it will take 380 years before the coating would be worn through to the copper base! Also on view was a new type of orange-peel chipping machine for marmalade, which, Major Crossley informed us, could chip 8 cwt. of peel per hour and is built practically entirely of stainless steel and Monel metal. It would, he also said, enable one girl to replace *six* operators on the older machines, which he substantiated by showing us "before" and "after" photographs of, if we remember rightly, Messrs. W. and P. Hartley's factory in which an installation of the new type has been made.

Stepping across the gangway, we entered Messrs. Bramigk and Co.'s (Ltd.) stand—another firm which apparently cherished an ambition to give the Minister of Labour cause for worry, for here again we inspected a large number of machines all designed to operate with the minimum of attention. The well-known "Soll-Koch" vacuum cooker was obviously receiving much attention, and a course of Pelmanism would be required to memorise all the duties we were told it could perform. It can cook everything apparently from caramels to hard sweets, all in the minimum time, and, in the case of clear goods, produces an absolutely glass-like appearance, no crystallisation of the sugar being possible. The pan does not require washing, and the cooker can also process any sugar recipes with a milk-fat base, chocolate centres, plastic goods, etc. It is made in two sizes, having outputs of one ton and 30 cwts. per eight hours respectively.

The semi-automatic cellophane wrapping machine shown by the same firm was a very timely exhibit in view of the interest now being taken in this material, and value was lent to this item by its being shown operating under working conditions. A bon-bon wrapping machine and a tin-foiler were also on view.

On the Jahn stand, the principal exhibit was the high-speed grinding and atomising mill for the continuous production of liquid chocolate mass. This was shown in operation, and attracted a good deal of attention, while another important item was the chocolate depositing machine, which could be altered almost instantaneously to change the weight of chocolate deposited.

Visitors wishing to find the essence and flavouring section had only to follow their noses, and by this process we found ourselves in an aroma of peppermint oil at the stand of Messrs. W. J. Bush and Co., Ltd., where all visitors, naturally enough, receive a "cordial" welcome. We were told that there were no less than sixteen varieties of this particular oil on the stand—a piece of information which we took on trust—many of which the firm had imported direct from the country of origin. Peppermint oil is an old stand-by of the confectionery manufacturer, and it is interesting to note that the popularity of this flavour seems to increase every year. The "Gold Medal" brand fruit-essences were prominently displayed, but these are too well-known to the trade to need much notice. Stress was laid upon the care taken in their production and the numerous tests which they undergo in the course of their manufacture. Some of the synthetic products of the firm, Vanillin and Coumarin, were also featured, and specially displayed so as to draw attention to their quality and purity.

It was only in the last issue of FOOD MANUFACTURE that an article on the application of transparent wrappings to packaging appeared, and on the stand of Messrs. W. S. Muir and Co., who are the sole agents for "Sidac," the advice given in the article was being put into practice. At the time of our visit a demonstration was being given showing how easily "Sidac" may be stuck and folded to form an attractive, as well as hygienic bag. A special point was made of the suitability of the new "Sidac Waterproof" for packing delicate and moisture-susceptible sweets.

Messrs. Boehm's stand occupied a strategic position at the corner of one of the main gangways, and

here we had the merits of Nulomoline explained to us. This, it seems, is a cane sugar preparation the object of which is to prevent fermentation, graining, and drying out. It is recommended for chocolate centres, toffees, caramels, boiled goods, marshmallows, etc. Another product marketed by the firm is "Convertit," a concentrated yeast invertase of great activity, a characteristic of which is its property to soften cream centres, while it also avoids fermentation. In these difficult days Messrs. Boehm's "Emulgo" should appeal to chocolate manufacturers, as it enables anything from 8 to 10 per cent. of the cocoa-butter to be saved, and, being a lecithin preparation, exerts a good effect on the finished product in a number of ways.

Gelatine is a product which has recently received the benediction of the scientists. At one time, we can remember, the use of gelatine by, say, an ice-cream manufacturer was regarded as something done merely to cover up ineffective freezing; but now it is realised that gelatine has important dietetic qualities, so all is well again. On stand 12A, which was occupied by the Union Glue and Gelatine Co., Ltd., we saw a very fine display of all sorts of sheet, leaf, and powder gelatines for the confectionery trade, and some of them were remarkable in their transparency.

On the spot, or, more properly, under the sign of the red ball, we found Messrs. Stevenson and Howell displaying a selection of their well-known flavouring essences, oils, and colours. The essential oils shown were guaranteed as to purity, while, similarly, the firm also offered a series of colours which they guaranteed fully to conform to the Food and Drugs and Chemistry of Health Regulations.

Flour from Bananas

By "Aztec"

FROM TIME to time the possibility of producing banana flour for consumption in temperate countries has created interest, and it is a proposition that is undoubtedly worth considering, not with a view to attempting to displace even a small proportion of the cereal flours now used, but rather of introducing it as a product for special purposes.

From an economic standpoint the large-scale production of banana flour is apparently quite practical. The yield of bananas per acre averages about 32,000 pounds, and in food value per acre a crop of bananas far surpasses what are considered the staple food crops of the world. This statement includes corn, potatoes, rice, sweet potatoes, and wheat. Coupled with this exceptionally high yield is the advantage that the cost of manufacturing banana flour is low.

Banana flour has a very pleasant flavour, and when freshly made possesses the characteristic odour of the fresh fruit. It is not quite so nutritious as wheat flour, as it has a considerably lower protein content; however, banana flour is richer in carbohydrates, and on a basis of food value, calculated in calories, it compares very favourably with wheat flour. One pound of wheat flour yields about 1,650 calories, while one pound of banana flour yields 1,610 calories; thus the difference is not very pronounced.

As fresh fruit bananas are far too bulky to make a satisfactory ration, for to obtain 10 ounces of carbohydrate it is necessary to consume about 50 ounces of fruit. But by means of dehydrating or converting the pulp into flour the banana can be reduced into a concentrated form that compares very favourably in nutrient value with products prepared from the cereals.

Banana flour is produced in the West Indies for local consumption. It is prepared from the fully grown but green fruit which has not yet commenced to ripen. In this green fruit the carbohydrates are still in the form of starch; as the fruit ripens the starch changes to sugar.

Approximately 50 per cent. of edible pulp is recoverable from the green bananas. There is about 50 per cent. of waste, and this includes both the stems and the skins.

The practice in the West Indies is to cut the fruit free from the bunches and soak it in warm water (temperature about 175° F.) for five minutes, which serves to loosen the green skin and facilitates its removal.

The pulp is split in halves with a blade made of silver, wood, or bone, and arranged on suitable trays. Much of the fruit is dried in the sun, but some is dehydrated with artificial heat; in a few very modern establishments vacuum driers have been installed. The moisture content is reduced to a minimum of 15 per cent. and the dried product is milled and reeled, using No. 13 (129-mesh) bolting cloth.

It is generally reckoned that about 18 per cent. of the gross weight of the green fruit can be recovered as flour carrying a moisture content of not more than 15 per cent.

In the following table the nutritive value of banana flour as compared with wheat flour is given:

Product.	*Moisture.*	*Protein.*	*Fat.*	*Carbohydrates.*	*Ash.*	*Food Value per Pound.*
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Calories.
Banana flour	9·7	3·1	0·5	84·1	2·6	1,610
Wheat flour	12·0	11·4	1·0	75·1	0·5	1,650

Banana flour is generally packed in paper-lined containers—either barrels or boxes.

It is stated to be difficult to make bread from a pure banana flour, but when blended with a proportion of cereal flour it gives highly satisfactory results. Using a pure banana dough which has been subjected to the action of steam under pressure, good quality bread has been produced. However, it is as a special flour for use in confectionery, and not for

the making of bread, that banana flour has the greatest potential value in Europe.

In the cultivation of bananas for the fresh fruit market a considerable proportion of the crop is undersize or otherwise unsuitable for shipment; much of this might be profitably utilised in the production of flour. But, further than this, it would seem that there are interesting possibilities in growing bananas expressly for flour manufacture.

An extensive educational campaign would be necessary to promote the use of banana flour in England, while the ability to offer it at an attractive price would be an important factor in developing a steady demand.

The Swelling of Canned Prunes

CANNED "ready-to-serve" dried prunes (dried prunes canned in syrup) have been produced in California for a number of years, but the pack has been relatively small owing to spoilage losses from swelling of the cans with hydrogen formed by corrosion. E. M. Mrak and P. H. Richert investigated the matter, and in their conclusions make the following points:

Swelling of enamel-lined cans was more rapid than that of coke-plate cans; in charcoal-plate cans it was slower than in coke-plate cans.

The prune-drying procedure apparently had no effect on the rate of swelling.

When the time or temperature of steam or water blanch was increased the rate of swelling increased.

The rate of swelling decreased when the concentration of syrup used was increased. However, 30 per cent. syrup was found to be the maximum sugar concentration that could be used, because more concentrated syrups caused the prunes to harden and shrivel.

The rate of swelling decreased when the depth of head space was increased. A comparatively large head space should be used, as this provides additional space for collection of the hydrogen gas.

An exhaust in steam for 10 minutes at 210° F. was found best.

The kind of gasket used had little effect on the rate of swelling; paper gaskets and rubber compound gaskets gave similar results.

Cooking for 1 to 1½ hours in boiling water was found best for canned prunes. Pressure cooking increased the rate of spoiling.

Decreasing the *p*H value of the syrup retarded the rate of swelling but not of corrosion, and it affected the colour of the prunes adversely.

Factory tests confirmed all the major findings of laboratory experiments.

Canned prunes should be distributed very soon after packing. If storage is necessary the storage temperature should be as low as practicable in order to retard corrosion.

For further information on this subject the reader should consult Bulletin 508 by E. M. Mrak and P. H. Richert, University of California College of Agriculture, Agricultural Experiment Station, Berkeley, California; issued in February, 1931.

THE following figures furnished in a report from Trade Commissioner James Somerville, Jr., London, show imports of canned salmon into the United Kingdom over a period of years:

UNITED KINGDOM IMPORTS OF CANNED SALMON

	From Soviet Russia.	*From United States.*	*From all Sources.*
	(Lbs.)	(Lbs.)	(Lbs.)
1924 ...	24,576,048	40,514,320	100,290,360
1925 ...	22,183,840	28,336,112	70,560,736
1926 ...	31,450,832	22,171,072	67,901,232
1927 ...	27,500,032	25,842,096	72,546,432
1928 ...	40,751,088	26,022,864	94,003,952
1929 ...	41,142,864	30,525,152	96,272,512
1930 ...	60,058,880	21,938,784	105,002,016

United Kingdom imports of other fish (except oysters for breeding) from Soviet Russia amounted to 2,367,568 pounds, valued at £180,000, during 1929 as against 6,113,520 pounds, valued at £278,000, during 1930.

Five factories are operated in Grand Canary for curing, drying, and salting of fish which is exported to the West Coast of Africa, according to the American Consul at Las Palmas, Canary Islands. Locally, this industry is rather important, employing a large number of fishermen and factory workmen. During 1930, it was reported that the capital invested in factories, equipment, and fishing vessels reached £300,000. This industry owes its relative importance to the island's proximity to the Afro-Canary fishing grounds, known for their wealth.

In addition to the fish preserving industry, the fishing activities by vessels of Las Palmas register engaged in the catch of the fresh fish requirements for local consumption, ocean-going vessels, and exportation to Spain, also attained some importance during 1930.

AN increased duty on canned asparagus imported into France will apply to shipments made after June 30, 1931. Under the new ruling, canned asparagus is placed under the general tariff rate of 200 francs per 100 kilos.

AMERICAN confectionery imports during the first half of this year, in comparison with those in the first six months of 1930, were:

JANUARY TO JUNE

	1930.		1931.	
	Lbs.	*Value.*	*Lbs.*	*Value.*
Soviet Russia ...	240,400	$22,735	1,757,404	$102,770
Germany	225,513	$52,852	238,321	$70,411
United Kingdom ...	325,054	$65,652	213,375	$47,343
Czechoslovakia ...	170,303	$20,144	153,021	$28,282
Belgium	11,270	$2,108	115,504	$10,695
Austria	95,080	$21,214	92,088	$10,800
Netherlands ...	80,057	$30,155	85,500	$28,[illegible]

One interesting result revealed is the great increase, nearly 800 per cent., of imports from Soviet Russia, which now heads the list.

Detergents

A LENGTHY paper on detergents for dairy use was presented by Frandsen, Phillip, and Mack, of Massachusetts, at The International Dairy Congress (1931) at Copenhagen. They found that washing powders on the market fall into four general classes, containing sodium carbonate, caustic soda, tri-sodium phosphate, and soap respectively.

Sodium carbonate has very good softening power, greatly aids washing mechanism, is a poor emulsifying agent, rinses very easily, has slow action on tin and very mild action on hands, and neutralises odour.

Sodium hydroxide is a poor water softener, with good washing power and poor emulsifying effect. It is very difficult to rinse, acts on metals, has a severe action on hands, is a strong caustic, and will pit cans.

Tri-sodium phosphate is an excellent water softener, with poor washing power and excellent emulsifying properties. It is easy to rinse, has very mild action on metals and hands, is a good solvent for casein, and gives buffer effect which keeps caustic strength uniform.

Soap has poor softening power, poor washing power, and excellent emulsifying properties. It is hard to rinse, has mild action on metals and hands, and is apt to leave scum in bottles.

Other ingredients are often added for specific purposes. Hypochlorites are added in some instances because of their germicidal action. Sulphates are occasionally added, but have no desirable qualities. Silicates of some metals are added to render protection to the machinery parts in contact with the solution. Sodium zincate and aluminate are sometimes added for protection of zinc and aluminium parts respectively. Resinates and gums are also occasionally found in the powders, and are usually added to protect copper fittings. Grit is added to some to clean metals. Borax, although not often found, has certain advantages of emulsification and disinfecting powers. The corrosion of tin-plated metals has practically been eliminated by treating tri-sodium phosphate with a small amount of sodium chromate, and the corrosion of aluminium products has been prevented by treating sodium carbonate with a small amount of sodium silicate.

Thus it may be seen that no one ingredient is a perfect washing compound of itself, and for efficient washing a mixture should be used. The authors stated that a satisfactory powder should analyse approximately 60 per cent. sodium phosphate and 40 per cent. tri-sodium phosphate.

Menhaden Fish Oils

AN INVESTIGATION of considerable importance has been carried out by J. R. Manning, E. M. Nelson, and C. D. Tolle on the vitamin D content of menhaden fish oils (*Investig. Rept.* No. 3, 1931, *Bureau of Fisheries, U.S. Dept. of Commerce*). All of the oils tested were fully the equal in vitamin D potency of a representative commercial menhaden fish oil previously reported by Nelson and Manning (1930). Four of the samples were superior to this commercial oil and equalled medicinal cod liver oil in vitamin D content. It is significant that the oils which showed the highest vitamin D potency were subjected to less heat in their various processes of manufacture than the other samples tested, with the exception of oil No. 2. Oils Nos. 2 to 7, inclusive, came from different catches of fish.

These results indicate that the method of production affects the vitamin D potency of the resultant oil. If the manufacturer of menhaden oil is interested in producing an oil for animal feeding, he can well afford to take precautions to preserve the vitamin content of the oil.

Menhaden Oils for Animal Feeding.

Work has also been carried out by R. W. Harrison and S. R. Poltinger on the commercial production of menhaden fish oil for animal feeding (see *Investig. Rept.* No. 4). It was thought that it might be possible to improve the vitamin D potency of these oils if certain changes were made in their manufacture. Experiments have demonstrated the steps in the present process of manufacture which are most destructive to the nutritional value, and suggestions relating to modification in factory procedure are made in the report.

Bibliography.

FIEDLER, R. H.: 1931. Fishery Industries of the United States, 1929. Appendix XIV., Report, U.S. Commissioner of Fisheries, 1930 (1931), pp. 705-1068, 29 figs. Bureau of Fisheries Document 1095. Washington.

HARRISON, ROGER W.: 1931. The Menhaden Industry *Investigation Report*, United States Bureau of Fisheries, vol. 1, No. 1, 1930, 113 pp., 30 figs. Washington.

MCCOLLUM, E. V., SIMMONDS, NINA, SHIPLEY, D. G., and PARK, E. A.: 1922. Delicate Biological Test for Calcium-Depositing Substances. *Proceedings, Society for Experimental Biology and Medicine*, vol. 19, 1921-22, p. 123. New York.

NELSON, E. M., and MANNING, JOHN RUEL: 1930. Vitamins A and D in Fish Oils. *Industrial and Engineering Chemistry*, vol. 22, No. 12, December, 1930, pp. 1361-1363. Easton, Pa.

STEENBOCK, H., and BLACK, ARCHIE: 1925. Fat-Soluble Vitamins. XXIII. The Induction of Growth-Promoting and Calcifying Properties in Fats and their Unsaponifiable Constituents by Exposure to Light. *Journal of Biological Chemistry*, vol. 64, No. 2, June, 1925, pp. 263-298. Baltimore.

Conservation of Wastes from the Small-Scale Slaughter of Meat Animals

The following summarises a report prepared by G. P. Walton and R. F. Gardiner issued as Circular No. 63, June, 1929, by the U.S. Department of Agriculture.

THE OFFAL and the shed blood from the large numbers of cattle, sheep, and swine butchered on farms and in small retail establishments in the United States every year represent, in the aggregate, thousands of tons of nitrogen, or ammonia, and of phosphates, which are potentially of value as fertiliser constituents. The experiments described in this circular were undertaken with the object of developing satisfactory means of disposing of the refuse from the small-scale slaughter of meat animals. The following methods of disposal were investigated: (1) Live-steam rendering of offal; (2) open-kettle rendering of offal; (3) preserving wet tankage, raw blood, and cooked blood with quicklime; (4) preserving and converting into fertiliser raw offal, wet open-kettle tankage, and raw blood by mixing them with superphosphates, with and without absorbents; and (5) preserving and converting into fertiliser raw offal and tankage by mixing them with sulphur and absorbents.

The offal from a steer of average size was rendered with live steam in an experimental tank of simple design. Although steam at only 20 lbs. pressure was used, the yield and quality of grease and tankage obtained were reasonably satisfactory. Since steam-pressure rendering, however, is not as a rule practicable on the farm, experiments in open-kettle rendering were conducted. From these experiments it is concluded that ordinarily the open-kettle cooking of offal and blood is feasible on the farm.

The moist tankage produced in the open-kettle rendering of offal was preserved in cool weather for use as fertiliser by being mixed with one-tenth of its weight of crushed freshly burnt quicklime. The mixture slowly dried in the air without rotting, and no appreciable quantity of ammonia was lost. Similar tests on fresh blood and on cooked blood solids gave satisfactory results.

Tests of converting raw offal into products that are suitable for use as fertiliser and that can be stored by mixing the offal with commercial grades of concentrated superphosphate and with ordinary superphosphate (acid phosphate) yielded satisfactory results when enough of the acidic agent was employed. Including in the mixtures a sufficient quantity of inert absorbent material to take up free water was found to be advisable. No specific evidence was brought out, however, to show that treating the raw offal with superphosphates (acid phosphates) and air-drying freed the product from disease-producing organisms and parasites that might be contained in the raw material.

Mixtures that were prepared in hot weather and that contained double superphosphate to the amount of one-tenth of the weight of the raw offal, or 16 per cent. superphosphate (acid phosphate) to the amount of one-third of the weight of the raw offal, dried in the air without loss of ammonia, and only a small part of the soluble phosphoric acid originally in the mixtures was converted into the unavailable tribasic form. The breeding of flies appeared to be prevented by the acid condition of the mixtures, and there was no putrefactive decay, although some sour-smelling fermentation developed.

Mixtures of freshly cooked, moist tankage and the acid-phosphatic agents behaved the same as the mixtures containing the raw offal but showed little or no sour fermentation. Similar tests on raw blood showed the advisability of employing larger quantities of the preserving agents.

Attempts to utilise sulphur, sulphur inoculated with oxidising bacteria, and absorbent material that had been moistened and incubated with inoculated sulphur, as the acid-preservative agents, were unsuccessful.

A series of controlled laboratory tests on preserving and air-drying fresh blood mixed with monocalcium phosphate and with commercial superphosphate (acid phosphate) yielded additional data indicating the minimal proportions of the acidic agents that should be employed. Also data were obtained concerning the degree of acidity developed in the mixtures, and the degree of acidity that is conducive to satisfactory results.

Calcium and Phosphorus in Diet

THREE workers, Kramer, Potter, and Gillum, of the Kansas Agricultural Experiment Station, have been investigating the utilisation by ten normal adults of the calcium and phosphorus in raw milk and in ice-cream, and a report has been published in the May issue of *The Journal of Nutrition* (p. 105). Milk, as is well known, is a good source of both calcium and phosphorus, and the work was designed to study the comparative values of ice-cream and raw milk in this respect.

Five of the subjects received ultra-violet irradiations daily, but no special advantages in the utilisation of calcium and phosphorus seemed to be conferred on them. Four of the non-irradiated and three of the irradiated subjects showed more favourable calcium balances when ice-cream was the chief source of calcium. Normal adult subjects on an acid-forming diet utilised the calcium from ice-cream made with condensed milk at least as well as the calcium of raw milk. In general, the phosphorus balances followed the trend of the calcium balance figures.

Trade News

International Aluminium Competition.

It will be remembered that, at the beginning of this year, the European producers of aluminium organised a competition in which prizes were offered for suggestions designed to develop the use of aluminium and its alloys.

The committee of judges has now finished the examination of the entries, and the following prizes have been awarded:

1. A prize of 25,000 French francs, awarded to Mr. Constantin Szmukler, 1, Rue Chaper, Grenoble (Isere), France, for a contribution on the use of aluminium in leather dressing and tanning.

2. A second prize of 25,000 French francs has been divided equally between Dr. H. Hampel, Elsasserstrasse 15, Pojeduch, b. Stettin, Germany, and Mr. de Haes, 3, Rue de Veeweyde, Bruxelles-Midi, Belgium, for two entries relating to the use of aluminium in radiators for central heating systems.

3. The special prize of 50,000 francs has not been awarded, the judges being of the opinion that no suggestion made was of sufficient importance and exceptional novelty to justify this award.

The competition aroused great interest in technical circles in the majority of countries. Approximately 1,000 persons approached the International Aluminium Bureau for information on the competition, and eventually 291 entries were submitted to the judges. For the most part, these entries were highly meritorious, and showed careful study of the properties of the light metals.

* * *

New National Mark Posters.

There is no doubt that the Empire Marketing Board frames, which are to be found in almost every town in England and Wales, have set a high standard of artistic poster advertising and have attracted considerable attention. The interest of the public in each new series of poster is very noticeable. The Ministry of Agriculture and Fisheries has recently secured the lease of the frames through England and Wales for three weeks for a display of posters advertising National Mark produce.

National Mark eggs, cider, tomatoes, cucumbers, and canned fruits were the subjects of this series, which should do much to secure wide recognition of the National Mark as the symbol of home produce of dependable quality. The range of National Mark commodities is steadily increasing, and now comprises flour, eggs, beef (in London, Birmingham, and Leeds areas), cider, apples, pears, tomatoes, cucumbers, strawberries, cherries, dressed table poultry, malt products, and canned fruits and vegetables. In due course it is hoped to extend the National Mark scheme to cover all articles of foodstuffs of commercial importance grown in this country.

* * *

The Sardine Canning Industry in Algeria.

The history of the sardine canning industry in Algeria during late years appears to have been the slow emergence of an Algerian industry from the primitive depôts established by firms alien to the country, according to information in a report from Algiers. It seems probable that the local market for canned sardines will increase in importance. A better product is being obtained with more experience, and the industry is beginning to attract the attention of a better class of local business men. At present the quality is good average, but there is as yet nothing comparable to the best French pack. Consequently, the Algerian product will require much care and good marketing before it can be universally sold under its proper description. Competition between the French and Algerian canned sardine has been limited to the passing off of the latter for the former. There is, however, open competition locally from the Portuguese and Spanish products, which are able to pay customs duty and transport and then undersell the local product by at least 1 cent a can. French packing interests on those coasts are considerable, and it seems probable that the lowness of the price is directed at the Algerian industry. The scope for extension of the present pack of sardines is very large, even though a fair proportion is unsuitable for canning. Figures given below show the total recorded catch in recent years:

	Total Recorded Catch. (Short Tons)
1926	5,790
1927	10,168
1928	8,725
1929	5,672
1930	6,415

* * *

Swedish Grocery Retailers Form Purchasing Organisation.

An organisation to fight the growing competition from the Co-operative Stores in Sweden was recently proposed at a meeting of stockholders in Aktiebolaget Hakon Swenson, Vasteras, a large wholesaler of foodstuffs capitalised at 1,500,000 crowns (£80,000), according to information from Stockholm, Sweden. The company is to issue new stock to be subscribed for by private grocers who heretofore have been customers of the company. The members, in addition to dividend payment on these shares, are to receive certain allowances in prices corresponding to their purchases. The meeting, which was attended by about 400 dealers, decided to participate in the company's plan.

* * *

Refrigeration and Ice Manufacture.

All the catalogues issued by Messrs. J. and E. Hall, Ltd., the refrigerating plant manufacturers of London and Dartford, reach a very high standard of interest and excellence, and this standard is more than maintained by their latest publication, *Refrigeration and the Manufacture of Ice.* A reproduction of the front cover of this book appears herewith; it is a substantial work of 120 pages, very well printed, profusely illustrated, interesting, and informative. It should be of great use to every manufacturer of perishable foodstuffs, as it covers the whole *gamut* of refrigerating applications, and no doubt Messrs. J. and E. Hall will forward a copy to those of our readers, interested in the subject, who care to apply to them.

* * *

Canners' Convention Dates.

According to a communication received last month from the secretary, the arrangements for the joint Imperial Fruit Show and Canners' and Allied Trades Exhibition are as follows: The exhibition, as previously announced, will be held from October 30 to November 7, the Canners' Convention will be held from November 2 to 4, *not* from the 4th to the 6th as was at first intended. Wednesday, November 4, will also be the retailers' day and conference, and Thursday, November 5, will be the growers' day and conference. Special rail travelling facilities have been obtained for visitors to the exhibition.

* * *

Sugar Factories Welfare Order.

The Secretary of State for the Home Department made an Order on August 7 under section 7 of the Police, Factories, etc. (Miscellaneous Provisions), Act, 1916, for securing the welfare of the workers employed in all factories or parts thereof in which the manufacture or refining of sugar is carried on.

The Order, which may be cited as the Sugar Factories Welfare Order, 1931, will come into force on October 1, 1931. Copies of the Order can be purchased from H.M. Stationery Office.

* * *

Sample Room to Promote Empire Trade.

Following the success which attended its efforts last year, the Empire Market-

ing Board has decided to repeat its "sample-room" at the Bakers' and Confectioners' Exhibition which opens in the Royal Agricultural Hall on September 5.

The room is modelled on the lines of a Mincing Lane trade exchange, and each dominion and colony taking part in the exhibition will have its own "counter," as well as a shop window for the display of its produce.

The aim of the exhibit is to reproduce as far as possible the atmosphere of an actual Eastcheap saleroom, and to provide a rendezvous where members of the trade may inspect and study at their leisure the many and varied foods produced within the Empire. The countries taking part in the exhibition this year are England and Wales, Northern Ireland, Canada, Australia, New Zealand, South Africa, the Irish Free State, and India, and their representatives will be in attendance daily throughout the course of the exhibition to answer trade enquiries about the supplying of their products.

A club for the use of members of the baking and confectionery trades is being provided by the Board, and all connected with the trade are cordially invited to use it.

So that buyers may know exactly the state of the markets during their visits to the exhibition, arrangements have been made for the installation of a Creed Teleprinter for the reception, hour by hour, of Reuter's service of produce market prices and news.

The following list shows the chief products the various countries will have on view:

England and Wales

An exhibit of All-English "National Mark" flour, malt flour, bakers' malt extract and eggs, English jams, canned fruits, honey, tinned milk, and milk powder.

Display organised by the Ministry of Agriculture and Fisheries in conjunction with the National Farmers' Union and the Trade Federation.

Northern Ireland

Eggs (fresh and liquid), hams, wafer oats, jelly crystals, canned apples, lard.

Display organised by the Ministry of Commerce for Northern Ireland.

Canada

Flour, fruit (canned and dried), honey, maple syrup, tomato catsup, pickles, fresh apples, coconut, "Certo," fruit juices, macaroni, milk (condensed and dried), cheese, wines, maple sugar, and "Jello."

Display organised by the Canadian Government Exhibition Commission.

Australia

General range of products, including sultanas, raisins, currants, butter, honey, canned peaches, pears, and apricots.

Display organised by the Australian Trade Publicity, Australia House.

New Zealand

Butter and cheese, dried milk, honey, apples, tinned sheep tongues, toheroa soup, fruit juices, glaxo, tinned oysters, tinned whitebait.

Display organised by the Office of the High Commissioner in London.

South Africa

Eggs, dried fruits, canned goods (pineapples, apricots, pears and goldenberries), crayfish, lemon and orange squash, wines, liqueurs, and brandies.

Display organised by the Office of the High Commissioner in London.

Irish Free State

Butter, eggs, bacon, hams, lard, honey, dried milk, tinned cream, condensed milk, spirits, carrageen moss.

Display organised by the Office of the High Commissioner in London.

India

Rice, lentils, tea, coffee, groundnuts, canned fruits, chutneys, pickles, jams, etc.

Display organised by the Indian Trade Commissioner.

A similar display is being organised by the Empire Marketing Board in the International Grocers' Exhibition, which takes place in the Royal Agricultural Hall between September 10 and 25. The exhibitors in this case are England and Wales, Scotland, Northern Ireland, Canada, Australia, New Zealand, South Africa, Irish Free State, India, Southern Rhodesia, East African Dependencies, and Malaya.

Bulk Storage of Foodstuffs in Wood Vats

THERE IS a tendency nowadays, when so wide a choice of metal, alloys, and other materials is offered for the storage of potable liquids and foodstuffs, to overlook the claims to important advantages offered by wood. We have accordingly obtained the following information regarding the advantages of employing wood for these purposes from a firm of specialist makers who, having been established 165 years, are able to discuss the subject with authority based on high reputation and vast experience; we refer to the firm of Messrs. Carty and Son, Ltd., of Peckham, London.

First of all, the point should be brought home that there are many varieties of wood and that a great elasticity of quality is consequently possible. It is sometimes thought that wood will impart a taste, but it is forgotten that there is at least one timber—New Zealand Kauri pine, for example—which will impart neither colour, smell, nor taste to any contents. On being planed up it shows a silky smooth hard surface, which will resist the penetration of liquids and be easy to clean. It is absolutely free from knots, rough places, or blemishes of any other description.

Then, as to the question of the vessels shrinking if left empty. This depends chiefly on how well seasoned the timber may be. If wood vats have sometimes given trouble in this respect it has generally been due, not to a characteristic drawback of wood vats as a class, but to insufficient scrupulousness on the part of the maker in permitting the use of unseasoned or partially seasoned timber. In enquiring for wood vessels, therefore, complete satisfaction as to the age of timber should be demanded by the buyer. Nevertheless, however seasoned the timber a certain shrinkage may take place under certain conditions, but this is overcome nowadays by the use of rod hoops fitted with tightening blocks. A turn or two with an ordinary spanner, and the vat becomes as tight again as when it left the works.

Then there are the advantages in respect to cost and durability; oak and Kauri pine are both extremely durable, and fermenting tuns made from the latter last from 30 to 40 years. In this connection it should not be forgotten that the vessel can always be planed out to give a hard and clean new surface.

Not only this, but wood vats are non-corrodable by any kind of foodstuff, they are unharmed by knocks and relatively rough usage, they are readily transportable, repairable, and always saleable, and they can stand comparatively high temperatures—in fact, wood vats are sometimes used for boiling.

Oak and Kauri are not the only timbers suitable for foodstuffs. A Midland firm favour tanks made from Louisiana Red Cypress to hold their fruit juices. The use of cypress, universal in America for tanks for all purposes, is gradually being appreciated in England. Archangel White Deal, in view of its absolute neutrality in colour and taste, also has its use, its chief attraction being its cheapness.

Thus there are many considerations to recommend the use of wood for the purposes under discussion, but again it should be emphasised that reliable advice should be sought in selecting a timber which is most suitable for the particular purpose, and that care should be taken to see that the wood is thoroughly seasoned, with all natural defects rigorously eliminated.

Enquiries

Enquiries are dealt with immediately on receipt, and the desired information is communicated in full by private letter. The replies given below are merely brief abstracts or indications that the names and addresses, or whatever may have been requested, have been supplied. Any further information supplied to us relating to the questions appearing below will be passed on to the enquirers. **N.B.—Enquirers are requested to use the special form which will be found below.**

342. *I require a steam pressure boiler heated by gas to use with steam jacketed pans. Can you recommend and give addresses of firms manufacturing these?* (Hamilton.)

Recommendations were made.

343. *Being interested in cream fillings, we wish to know if any articles dealing with this subject have been published in* FOOD MANUFACTURE. (Glasgow.)

No special article has yet appeared, but one is in course of preparation and will be published in a future issue.

344. *We should be glad if you could let us have the address of a firm making pot or porcelain tops for salt and pepper dredges.* (Darwen.)

This information was supplied.

345. *Have you any information with regard to the use of lecithin as an emulsifying agent? If so we shall be glad if you will forward to us or tell us where the information can be obtained.* (London.)

Lecithin is doubtless one of the most important of Nature's emulsifying agents. It is almost universally distributed in plant and animal cells—in egg yolk, seeds, milk, butter, and so on—and, related to fats, possesses additional features in the presence of a phosphoric acid radical in its composition and in being particularly active as an emulsifying agent. This group of properties would be expected to give lecithin an especially important and unique position in the manufacture of foodstuffs. Nature has provided and utilised a special substance for her purposes and at the same time has thrown out a broad hint to manufacturers. It is therefore surprising that the use of lecithin is only a comparatively recent affair, and one may look forward to a great expansion in its applications. Several articles have appeared in American confectionery journals—notably one by Dr. Rewald (August, 1930) on lecithin as an emulsifying agent—and an article was published by R. H. Morgan in FOOD MANUFACTURE of March, 1930. Bhatnager has studied emulsions of kerosene in water, using casein, albumin, and lecithin as emulsifiers (see *J. Phys. Chem.*, 29, pp. 587, 738, 834, and *J.C.S.*, 119, p. 1760, 1921). Also consult Lewis and Price on the physico-chemical behaviour of lecithin (*Biochem. Journ.*, 1929, 23, p. 1030).

346. *Can you give us the names of the manufacturers of 7-lb. containers with lever tin lid and tin bottom?* (Sunderland.)

Names of likely firms submitted.

347. *Can you possibly let us know who are the makers of the enclosed substance, which is marketed as "Cherry Substitute"? We think it is candied peel stained and cut.* (Newcastle-upon-Tyne.)

We agree with your opinion of the sample. In an endeavour to trace the makers we are forwarding your sample to an expert for his examination.

348. *Do you by any chance know the makers of the "Gervis" self-fixing bottle caps?* (London.)

349. *References to literature dealing with dried and canned prunes requested.* (Cardiff.)

These were supplied.

350. *We would appreciate the name of a text-book furnishing English formulæ for the making of sauces and royal icing.* (Columbus, U.S.A.)

Suggestions were made as to sources of information.

351. *Addresses of the makers of the Premier Mill and the Circulator Mill required.* (Holland.)

The names and addresses of the makers of these machines were supplied.

352. *I noticed in the enquiry section of* FOOD MANUFACTURE, *June 31, that you gave information regarding food laws. I should be glad to have this information.* (London.)

References were given to the available literature on the subject.

353. *Names and addresses of firms who could supply banana flour requested.* (Devon.)

The enquirer was put in touch with sources of information on this matter.

354. *Can you supply names of firms making machines suitable for pressing gravy salt into moulds?* (Gloucester.)

A list of likely firms was supplied.

355. *I shall be glad if you can tell me where I can obtain a small quantity of mono-sodium glutamate.* (London.)

After some difficulty a small quantity of the almost pure salt was obtained and forwarded to the enquirer. Information was given as to where supplies of the material may be obtained in Japan, but, so far as we know, there is none to be had in this country.

356. *With reference to the article on "Hydroxybenzoic Acid Esters" which appeared in your January issue of* MANUFACTURING CHEMIST, *would you tell us whether these preservatives are allowed to be used in foodstuffs.* (London.)

The Ministry of Health states that the addition of these preparations to food intended for sale is prohibited by the Public Health (Preservatives, etc., in Food) Regulations, 1925-1927.

357. *I was very much interested in Mr. Stewart's article on "Piping Jellies" which appeared in the May issue, and would like to ask you the following questions arising out of this article:*

(a) *Where tartaric acid is mentioned in formulæ* 1, 2, *and* 3, *I take it tartaric solution is meant?*

(b) *What strength of Nutrl-Jel was used? According to literature which I have there are at least two grades; one being double the strength of the other.*

(c) *When apple juice is not available, what quantity of liquid pectin could be substituted?* (Liverpool.)

(*a*) It is mentioned in the article on "Piping Jellies," if you will reread it, that tartaric acid is used as a solution and the solution is made by dissolving 1 part of pure acid in $2\frac{1}{2}$ parts water.

(*b*) The Nutrl-Jel referred to in the formulæ was (export grade) Nutrl-Jel (powdered apple pectin), and this is of such a strength that one part will form a firm jelly with 100 times its own weight of sugar when using all water for the liquid content and one-third of one part fruit acid. The sugar content of this finished jelly should be from 60 to 65 per cent. Further information on this substance can be obtained from H. Mayer Senior, Ltd.

(*c*) I have not used liquid pectin, therefore cannot say how much should be used in place of apple juice.

If you find these jellies too stiff for your use, then, as is suggested in the article, use a little less agar-agar or a little less apple pectin, then you will arrive at a jelly that will meet your requirements.

Formula No. 1 is the best jelly I have made for piping purposes, but if you find it is too firm reduce the agar-agar to 3 ozs. per 4 qts. water.

Formula No. 4 is also suitable for my requirements, but, again, if this is too firm reduce the apple pectin to 5 ozs. and the tartaric acid solution to 3 ozs. and it will not be quite so firm.

With these suggestions you ought to be able to improve your results and get the jellies to the consistency you require.

J. STEWART.

358. With reference to enquiry No. 331 concerning the use of pectin, it was not, perhaps, made sufficiently clear that the advantages of powder over liquid pectin apply equally to powdered apple as to powdered citrus pectin, and that both are used in the same manner and for the same purposes.

359. In the answer to enquiries Nos. 261 and 316 mention was made of a special mayonnaise mustard flour which is available in America. It should not, however, be overlooked that mayonnaise mustard is made in this country. Thus Messrs. J. and J. Colman, Ltd., have been supplying mustard for mayonnaise purposes both in this country and in America ever since mayonnaise was a commercial article.

360. *I should be greatly obliged if you could give me the name of a London wholesale house for the sale of herbs.* (Manchester.)

The names and addresses of several firms were submitted.

361. *Can you oblige by telling me the makers of machines for producing and filling gelatine capsules?* (London.)

Names recommended.

362. *Kindly give us the name and address of the manufacturers of trihydroxyethylamine linoleate.* (Leeds).

This was supplied.

363. *Name and address of the manufacturers of Nipagin, etc., required.* (Glasgow.)

Also supplied.

364. *Can you recommend a firm capable of building a plant for making ethyl chloride?* (London.)

The name of a suitable firm was submitted.

365. *Who are now the makers of the Cooker Patent filling machine? I believe it originated in Burton-on-Trent. Could you tell me if this machine would be suitable for filling 2-oz. milk jars?* (Montreal.)

We do not know the makers of this machine, but have inserted the query in case it may catch the eye of someone with the necessary knowledge.

366. *Can you give us any information on the subject of liquorice substitutes?* (Gloucester.)

A paper on this subject was read by Fischer and Goodrich before the American Pharmacy Association last year. A reference to it also occurs in the *American Journal of Pharmacy* for November, 1930.

ENQUIRY FORM (F.M.)

(For office use only)

No. _____

Date _____

FIRM .....

ADDRESS .....

TRADE .....

Individual making Enquiry .....

Nature of Enquiry:

_____

_____

_____

_____

N.B.—Subscribers should enclose a stamped, addressed envelope for reply. Non-subscribers will be answered only in the journal, and should enclose a postal order for 1s. 3d. to cover the cost of the copy of "FOOD MANUFACTURE" containing the reply. The enquiry may be made either in the space provided above or in a separate letter, but in every case the above form must be completed.

Financial News

The Editor cannot accept responsibility for any errors which may appear in the Financial News Section

BANK RATE (1930–1931)

1930.	February 6	4½ per cent.
,,	March 6	4 ,,
,,	March 20	3½ ,,
,,	May 1	3 ,,
1931.	May 14	2½ ,,
,,	July 23	3½ ,,
,,	July 30	4½ ,,

Reduced prices and fluctuating exchange rates caused a substantial decline in the margin of profit realised by many food manufacturing concerns during the past financial year, and in the case of **Crosse and Blackwell, Ltd.**, the balance of profit was only £81,682 as compared with £211,204 during 1929, and £202,081 during the preceding twelve months. Registered in 1920, the company owns the entire issued share capital of **Crosse and Blackwell (Manufacturing Company), Ltd.**, and of **Alexander Cairns and Sons, Ltd.**, and almost all the ordinary capital of **Champion and Slee, Ltd.**, and has a controlling interest in several chocolate manufacturing companies, the authorised share capital being £10,000,000, of which a total of £2,536,748 has been issued and paid up, comprising £2,250,000 in 7½ per cent. cumulative participating preference shares of 15s. each, and £286,748 in ordinary shares of 1s. denomination. The following is a summary of the 1930 appropriation account:

	£	£
Brought forward from 1929		52,525
Profit—year ended December, 1930		81,682
Disposable Balance		£134,207
7½% dividend on £2,250,000 Cumulative Participating Preference 15s. Shares		130,781
Carried forward to 1931		3,426
		£134,207

The principal assets and liabilities are as follows:

	Dec., 1930. £
Goodwill and Trade-marks	1,381,522
Interest in, and Advances to, Associated Companies	2,909,204
Stocks	181,747
Debtors	58,961
Cash	89,776
Creditors	215,449
Bank Loans	45,728
Advances Secured on Stocks	140,498
Owing to Subsidiary and Associated Companies	57,556
6½% Debenture Stock	1,500,000
Specific Reserve	175,000
General Reserve	28,108

The debenture stock was recently marked at 79, the preference shares at 6s., and the ordinary shares at 6d.

The accounts of the **Union Cold Storage Co., Ltd.**, covering the year to December last, disclose a gross profit of £981,703, which compares very favourably with the gross profit of £968,288 realised in 1929. After debiting interest charges, the profit amounted to £950,666 as against £946,144, and with £184,484 brought in from the previous appropriation account, the available balance was £1,135,150, enabling the ordinary dividend to be maintained at the rate of 10 per cent., and a larger amount to be carried forward. The company, which was registered in 1897, owns refrigerating steamers and also the entire share capital of several cold storage and produce companies, and all the authorised share capital of £12,000,000 has been issued and paid up in four classes, consisting of £8,000,000 in the form of 6 per cent. cumulative preference shares, £2,000,000 in 7 per cent. cumulative preference shares; £1,000,000 in 10 per cent. "A" cumulative preference shares, and £1,000,000 in ordinary shares, all of £1 each. The final figures for 1930 are summarised below:

	£	£
Brought forward from 1929		184,484
Profit—year ended December 31, 1930		950,666
Disposable Balance		£1,135,150
Allocated to Depreciation Reserve		125,000
6% dividend on £8,000,000 Cumulative Preference £1 Shares		480,000
7% dividend on £2,000,000 Cumulative Preference £1 Shares		140,000
10% dividend on £1,000,000 "A" Cumulative Preference £1 Shares		100,000
10% dividend on £1,000,000 Ordinary £1 Shares		100,000
Carried forward to 1931		190,150
		£1,135,150

The following are some of the main assets:

	Dec. 31, 1930. £
Property and Plant	6,408,896
Steamships, etc.	1,565,829
Shares in Subsidiaries	7,955,520
Sundry Investments	67,181
Debtors, including Loans	2,517,462
Stocks and Stores	150,736
Advance Payments	76,473
Cash	253,455

The sundry creditors at the close of the financial year aggregated £2,506,146. The 6 per cent. preference shares were recently marked at 21s., and the 10 per cent. "A" preference at 27s. 6d.

During the twelve months ended March 31 last a net profit of only £25,319 was realised by **Parkinson and Cowan, Ltd.**, as compared with a net profit of £88,115 realised during the previous financial year. After adding the sum of £28,810 brought forward from the 1929-1930 account, there was a disposable balance of £54,129, necessitating a reduction in the rate of ordinary dividend from 10 per cent. to 2½ per cent., with no allocation to reserve. The authorised share capital of the company is £1,500,000, of which £1,209,785 has been issued and paid up in the form of £483,914 cumulative preference £1 shares, carrying a dividend of 7 per cent.; and £725,871 ordinary £1 shares. The results for the past year are summarised below:

	£	£
Brought forward from 1929-1930		28,810
Net Profit—year ended March 31, 1931		25,319
Disposable Balance		£54,129
7% dividend on £483,914 Cumulative Preference £1 Shares		29,802
2½% dividend on £725,871 Ordinary £1 Shares		16,353
Carried forward to 1931-1932		7,974
		£54,129

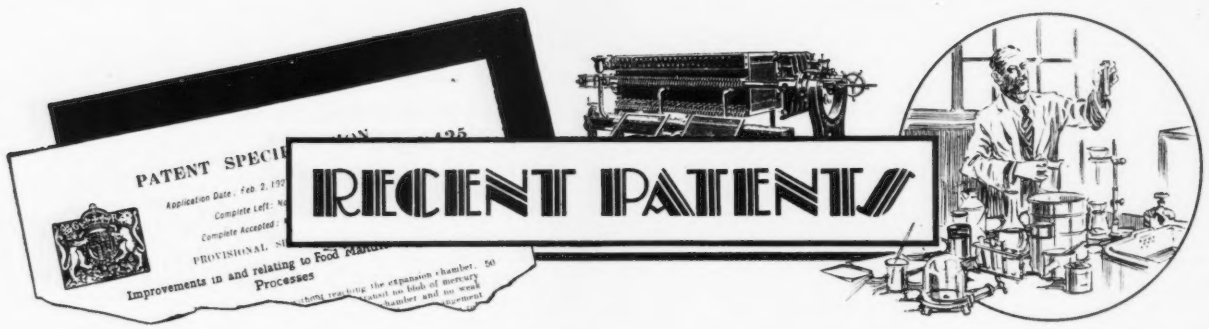
The balance sheet gives the following items:

	March 31, 1931. £
Investments in Subsidiaries (at cost)	1,309,115
General Investments	27,883
Loans to, and sums due from, Subsidiaries	43,275
Debtors	1,414
Cash	55,934
Creditors, including amounts due to Subsidiaries, unpaid interest, etc.	35,713
Australian Currency Depreciation Fund	122,033
Special Reserve	13,250
Premium on Shares	24,141

At 18s. 6d. the preference shares yield 7½ per cent., and recently the ordinary shares were quoted at 14s. 9d.

STOCK AND SHARE LIST

	August, 1931.	*Par Value.*	*July*, 1931.
Aerated Bread: Ord. ...	19/4	£1	19/6
6½% Pref.	21/5	£1	21/6
Apollinaris: Ord.	4/2	£1	4/2
Assoc. Biscuit: 6½% Pref. ...	22/-	£1	22/3
Avery (W. and T.): Ord. ...	46/-	£1	45/9
5% "A" Pref.	4⅝	£5	4½
5½% "B" Pref. ...	20/6	£1	20/-
Benger's Food: Ord. ...	28/-	£1	30/-
6% Pref.	5 1/16	£5	5 1/16
Bovril: Ord.	23/9	£1	24/-
Deferred	33/6	£1	35/9
6% Pref.	22/6	£1	23/-
4½% Deb.	92½	£100	29/-
British Aluminium: Ord. ...	27/3	£1	91
6% Pref.	20/-	£1	19/11
British Thomson Houston:			
7% Pref.	23/5	£1	23/-
Bucknall (H.) and Sons:			
Ord.	22/-	£5	22/-
Cadbury: 6% Pref.	24/3	£1	24/-
8% 2nd Pref.	29/-	£1	28/8
Callard, Stewart and Watt:			
6% Pref.	18/9	£1	18/6
Carrs: 6½% Pref.	21/6	£1	21/3
Cerebos: Ord.	5⅞	£1	6
Chivers: 6% Deb.	100½	£100	101
Cinzano: 7½% Pref. ...	20/9	£1	20/6
Clark's Bread: Ord. ...	22/6	10/-	22/8
Cow and Gate: 7½% Pref.	22/6	£1	22/9
Criterion Restaurants: Ord.	6/9	5/-	6/10
Crosse and Blackwell: Ord.	6d.	1/-	10d.
7½% Pref.	4/7	15/-	5/8
6½% Deb.	79	£100	82
Dutch Margarine: 5½% Pref.	21/4	£1	21/3
English and Dutch Meat:			
8% Deb.	50	£100	49
Ewart and Son: Ord. ...	10/6	5/-	10/4
16% Pref.	19/6	10/-	19/3
Foster Clark: Ord.	36/3	10/-	40/-
Fry's: 8% "B" Preferred	22/6	£1	22/4
Fullers: Ord.	34/-	£1	34/3
7% Pref.	20/3	£1	20/6
Gordon Hotels: Ord. ...	6/9	£1	7/3
4% Perp. Deb.	66½	£100	67
Grape Produce:			
8% Ptg. Pf'd. Ord. ...	1/5	5/-	1/3
H.P. Sauce: Ord.	91/3	£1	92/3
Hill (W.): Ord.	5/3	£1	6/3
Holbrooks: Ord.	12/6	5/-	11/9
5% Pref.	4½	£5	4⅜
Home and Colonial: Ord. ...	14/6	4/-	14/8
15% Cum. Ord.	55/-	£1	53/-
6% Cum. Pref.	6	£5	5⅞
Honywood Hotels: Ord. ...	1/7	2/6	1/6
8% Pref.	12/6	£1	12/3
Hovis: 6% Cum. Pref. ...	23/3	£1	23/6
Imperial Chemical: Ord. ...	12/6	£1	15/-
Deferred	3/3	10/-	4/3
7% Cum. Pref.	19/6	£1	21/-
International Tea: Ord. ...	22/4	5/-	22/9
6% 1st Pref.	23/9	£1	24/-
7% "A" Pref.	26/6	£1	25/3
Jones (R. E.): Ord.	1/6	5/-	1/4
10% Pref.	6/9	£1	6/7
Jurgens:			
7% Cum. Partg. Pref. ...	24/-	£1	24/3
Kia-Ora: Ord.	7/3	10/-	7/6
Liebigs: (Reg.)	9½	£5	10¼
(Bearer)	8⅞	£5	10¼
5% Pref.	95/3	£5	96/-
Lipton: Ord.	5/6	1/-	5/7
5% 1st Pref.	8/9	10/-	8/10
6% Pref.	10/9	10/-	11/-
6% Deb.	102	£100	103
Lovell and Christmas: Ord.	11/10	£1	8/9
Lyons: Ord.	93/2	£1	93/9
"A" Ord.	91/-	£1	93/-
5% Pref.	21/6	£1	21/3
6% Preferred Ord. ...	23/-	£1	22/3
7% Pref.	27/3	£1	27/6
8% Pref.	31/2	£1	30/5
Manbre and Garton: D'f'd.	13/1	2/-	13/6
Mather and Platt: Ord. ...	21/3	£1	26/-
Maypole Dairy:			
20% Preferred	17/-	5/-	17/3
Deferred	4/6	2/-	4/7
5% Pref.	19/6	£1	20/-
Mazawattee Tea: Ord. ...	11/3	6/8	11/9
Meadow Dairy: 7½% Pref.	24/6	£1	24/6
Mellin's Food: 6% Cum. Pref.	1/6	£1	3/9
Molassine: 7% Pref. ...	12/10	15/-	12/9
Nathan (J.): Ord.	1/2	1/-	1/6
7% Pref.	15/-	£1	15/9
8% Preferred	5/9	10/-	8/-
Nestlés: 8% Pref.	30/-	£1	30/10
Parkinson and Cowan: Pref.	18/6	£1	20/-
Pascall (J.): 8% Preferred	5/7	£1	5/6
Peak Frean: 5% Pref. ...	18/9	£1	18/1
8% "A" Pref.	25/6	£1	25/-
Radcliffs Edible: Ord. ...	1/1	1/-	1/2
8% Pref.	6/9	10/-	7/-
Radiation: Ord.	33/6	£1	34/3
6% Pref.	22/2	£1	22/9
Rowntree: 7% 2nd Pref. ...	21/6	£1	21/9
Salt Union: Ord.	23/-	£1	23/2
7% Pref.	28/6	£1	26/9
4½% Deb.	83	£100	83
Schweppes: Deferred ...	22/8	£1	21/-
4% Deb.	78	£100	77
Scribbans: Ord.	12/10	£1	13/6
Deferred	1/8	1/-	1/9
Slaters and Bodega: Ord. ...	26/6	£1	26/-
6½% 2nd Pref.	21/9	£1	21/6
Smithfield and Argentine Meat:			
7½% Cum. Pref.	15/3	£1	15/6
Smith's Potato Crisps: Ord.	8/-	5/-	8/8
Spiers and Pond: Ord. ...	13/9	10/-	12/6
6½% Pref.	21/-	£1	20/-
5% Deb.	97	£100	96½
Spillers: Ord.	29/-	£1	28/3
6% Pref.	21/-	£1	21/11
Deferred	13/-	£1	12/-
Strand Hotel: Pref'd. Ord.	64/9	£1	65/-
Tate and Lyle: Ord. ...	37/3	£1	39/-
6½% Pref.	24/3	£1	24/6
Trust Houses: Ord. ...	13/6	£1	14/3
Unilever: Ord.	29/6	£1	36/-
7% Preferred	25/-	£1	25/2
Union Cold Storage:			
6% Pref.	21/-	£1	20/8
7% Pref.	21/9	£1	21/3
10% Pref.	27/6	£1	27/6
United Caterers: Ord. ...	7½d.	5/-	8d.
United Dairies: Ord. ...	33/6	£1	34/-
6% Pref.	23/3	£1	23/-
United Glass Bottle: Ord. ...	17/9	£1	18/1
Preferred	22/9	£1	21/-
United Molasses: Ord. ...	10/4	£1	11/6
6% Pref.	10/6	£1	11/-
Van den Berghs:			
15% Preferred Ord. ...	10/9	5/-	11/-
Victoria Wine: Ord. .	5/6	5/-	5/9
8% Pref.	20/6	£1	21/-



These particulars of New Patents of interest to readers have been selected from the Official Journal of Patents, and are published by permission of the Controller of H.M. Stationery Office. The Official Journal of Patents can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Latest Patent Applications

21108. CAMBIO PRODUCTS, LTD., and MACCURDY, J. T., and MAPSON, L. W., and NOLAN, H. O. : Manufacture of concentrated edible products. July 23.

21038. COOPER, N. R. : Conservation of foodstuffs, etc. July 23.

21034. KELLY, T. D. : Treating food products. July 25.

20384. BARKER AND DOBSON, LTD., and ROBERTS, H. R. : Manufacture of sweetmeats. July 16.

20385. STORRAR, A. : Containers for foodstuffs. July 16.

Specifications Published

352,673. DEUTSCHE GOLD-UND SILBER-SCHEIDEANSTALT VORM ROESSLER : Process for the manufacture of products having a saline taste suitable for food purposes.

352,852. BAUERMEISTER MASCHINENFABRIK and MUHLENBAUANSTALT GES., H. : Process of an apparatus for the production of a chocolate mass ready for rolling.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

Abstracts Published

Group abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued, on payment of a subscription of 5s. per group volume, or in bound volumes price 2s. each.

347,217. **Sugar.** INTERNATIONAL INDUSTRIAL AND CHEMICAL CO., LTD., 120, St. James Street, Montreal, Canada; and WITTOUCK, S., 6, Rue d'Argenson, Paris.

Saccharose is extracted from cane molasses by diluting the molasses with a substantial quantity of aqueous liquor obtained by the washing of insoluble organic barium compounds, and then treating with baryta for the destruction of reducing sugars and to obtain a purified saccharose solution suitable for treatment on generally known lines. After the addition of baryta the mixture is heated, stirred, and filtered to separate the insoluble organic barium compounds from the soluble organic barium compounds, the alkaline salts, and the saccharose. The insoluble organic compounds are washed with water and the wash waters are collected, and these are used for diluting a further quantity of molasses. Barium hydrate in the proportion of about two molecules thereof to one molecule of contained saccharose is added to the solution to precipitate barium saccharate, which is carbonated to produce sugary juice and barium carbonate. All traces of barium are eliminated from the sugary juice by adding a small quantity of an alkaline salt such as sulphate or carbonate. An example of the process is given.

345,302. **Preserving milk.** RILEY, G. W., and SCOTT AND SON (LONDON), LTD., G., Bradfield Road, Silvertown, London.

Milk, delicate liquid foodstuffs, and the like are reduced to powder form by evaporation and grinding, both operations being conducted independently and in a vacuum. The milk is fed through inlets on to endless bands moving over hot plates in a vacuum chamber and dry solid is removed by scrapers and falls through an outlet into a breaker and thence into a grinding chamber. The ground material is stored in a receiver. Vacuum is maintained in the whole plant by a suction pump. Isolating valves and air inlets are provided so that the vacuum can be released in the grinding chamber and received independently.

Recent Trade Marks

This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal," and is published by permission of the Controller of H.M. Stationery Office. The "Trade Marks Journal" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

KENTISH QUEEN.—523,547. **Peas (for food).** FOSTER CLARK, LTD., Eiffel Tower Works, Hart Street, Maidstone, Kent. August 5.

VITABAR.—519,162. **Sweetmeats.** THE TROPICAL VITAMIN COMPANY, INC., North Orange Avenue, Orlando, Florida, United States of America. July 29.

521,844. **An illustration of a nurse and the word "hospital." Tea, coffee, and cocoa.** CHARLES STANSFIELD HICKS, 59, Eastcheap, London, E.C. 3. July 29.

DUNCAN'S.—511,538. **Chocolate, chocolate confectionery, and sugar confectionery.** W. AND M. DUNCAN, LTD., Regent Works, Beaverhall Road, Edinburgh. July 29.

VITA WAY.—519,161. **Sweetmeats.** THE TROPICAL VITAMIN COMPANY, INC., North Orange Avenue, Orlando, Florida, United States of America. July 29.

KRUSKIES.—521,934. **A food preparation consisting of rice powder, eggs, and powdered prawns, the whole being fried in nut oil.** The firm trading as the RIDGWAY FOOD PRODUCTS COMPANY, 4a, Thane Works, Thane Villas, Seven Sisters Road, Holloway, London, N. 7. July 29.

NUTROMALT.—522,553. **A malt food for infants in powdered form.** A. WANDER, LTD., 184, Queen's Gate, London, S.W. 7. July 29. (Associated.)

FOOD MANUFACTURE is sent to any address in the World for 10s. per annum. Send your subscription now to LEONARD HILL, LTD., Thanet House, 231-2, Strand, London, W.C. 2.